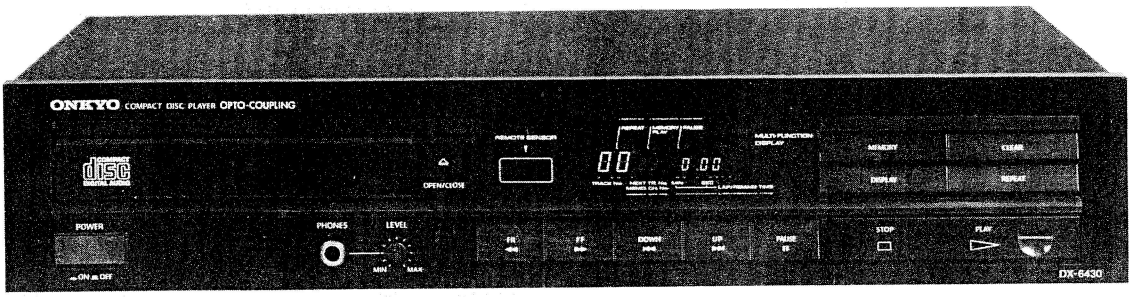
SERIAL NO. 3266

ONKYO® SERVICE MANUAL

COMPACT DISC PLAYER
MODEL DX-6430



Black and Silver models

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

SPECIFICATIONS

Signal readout system:	Optical non-contact
Reading rotation:	About 500~200 r.p.m. (constant linear velocity)
Linear velocity:	1.2~1.4m/s
Error correction system:	Cross interleave readsolomon code
Decoded bits:	16 bits linear
Sampling frequency:	88.2kHz (two-times oversampling)
Number of channels:	2 (Stereo)
Frequency response:	5Hz~20kHz
Total harmonic distortion:	0.03% (at 1kHz)
Dynamic range:	93dB
Signal to noise ratio:	96dB
Channel separation:	87dB (at 1kHz)
Wow and Flutter:	Below threshold of measurability
Power comsumption:	13 watts
Output level:	2 volts r.m.s.
Dimensions (W x H x D):	435 x 88 x 357mm 17-1/8" x 3-7/16" x 14-1/16"
Weight:	4.8kg, 10.6 lbs.

Specifications are subject to change without notice.

ONKYO
AUDIO COMPONENTS

TABLE OF CONTENTS

SERVICE PROCEDURES

1. Removing the Locking Plate

Locking plate is located on the bottom panel of this unit. Before using this unit for the first time, the plate must be removed. If power is switched on while this part is still in place, the unit will not operate properly

1. Locking plate
2. Tapping screw

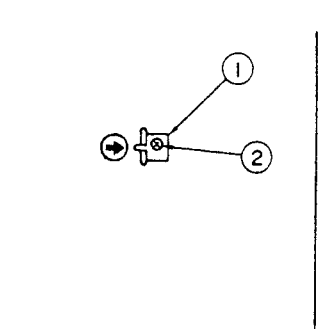


Fig. 1

2. Procedures for replacement of flat packaged ICs

1. Tools to be used:

(1) **Soldering iron** . . . . Grounded soldering iron or soldering iron with leak resistance of 10 Mohms or more.

Form of soldering iron's tip:

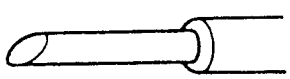


Fig. 2

(2) **Magnifying glass** . . . for checking of finished works
(3) **Tweezers** . . . . . for handling of IC and forming of leads
(4) **Grounding ring** . . . . Countermeasure for electrostatic breakdown
(5) **Nipper** . . . . . for removing defective IC
(6) **Small brush** . . . . . for application of flux

2. Work Procedures:

(1) **Remove the defective IC**
Cut all leads of the defective IC one by one using a nipper and remove the IC.

(2) **Clean the pattern surface of the PC board.**
Get rid of the remaining leads and solder.

(3) Check and from the leads of the new flat packaged IC to be installed.
From every lead on the new IC using a pair of tweezers, so that all of them are aligned neatly without being risen, twisted or inclined toward one side. Especially the rising portion of every lead must be formed with greatest care.

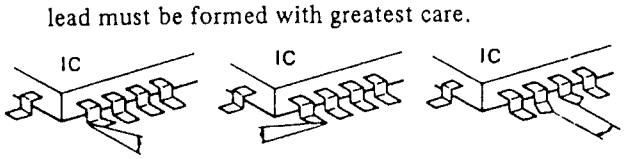


Fig. 3

(4) **Apply flux to the PC board.**
Apply flux to the pattern surface of the PC board which has been cleaned, as shown in the illustration. The area to be applied with flux is the portion of about 2.5mm in width where the IC's leads are to be soldered.
Be careful to apply minimum amount of flux required so as not to smear it on unwanted areas.

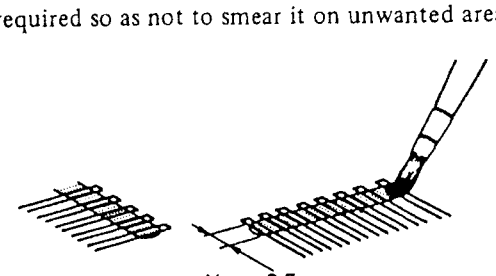


Fig. 4

(5) **Temporarily tighten the IC**
Carefully align the pattern and IC's leads, so that the IC will be temporarily tightened to the pattern on the four leads at the corners. At this time, soldering is required, but no need to apply soldering material.

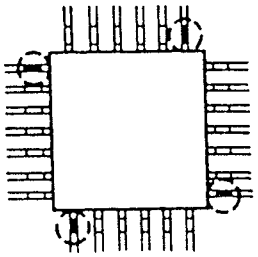


Fig. 5

(6) **Apply flux to IC's leads**
Apply flux to the areas of IC's leads where soldering is to be performed. Be careful not to smear flux on the root portion of any lead or the body of IC.

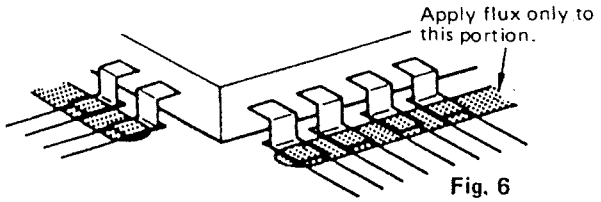


Fig. 6

(7) **Soldering**
While attaching the tip of the soldering iron to the soldering point as shown in the illustration, feed 2 –5mm of soldering wire. Then, slowly move the iron in the direction indicated by the arrow in the illustration, so that the leads will be soldered to the pattern. Move the iron in the rate of approximately 1cm in 5sec. Proceed with your work while confirming a clean fillet of solder is formed on each lead, subsequent to the melting of flux.

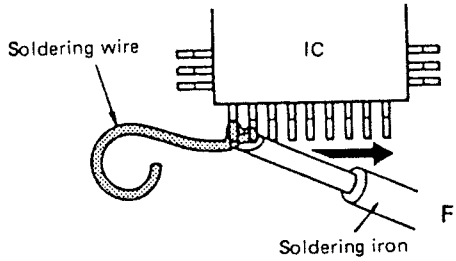


Fig. 7

CAUTION
1) If you move the iron too quickly, loose soldering is likely to result.
2) Be especially careful when soldering the first lead where loose soldering is most liable to be formed.

(8) **Check the results**
When soldering of all leads is finished, check the soldered portion on every lead with a magnifying glass. A tester must not be used or checking of any soldered position

NOTE ON COMPACT DISC

- **Holding Compact Discs**

Hold Compact Discs by the edges so that you do not touch the surface of disc. Remember that the side of the disc with the "rainbow" reflection is the side containing the audio information.
Do not attach tape or paper to the label side of the disc and always be careful not to leave fingerprints on the side that is played.

- **Storing Compact Discs**

Store Compact Discs in a location protected from direct sunlight, high heat and humidity and extremely high and low temperatures. Discs should never be left in the trunk or interior of an automobile in the sun since the temperature can become very high in such a closed environment.
Always store Compact Discs in the holders in which they were sold. Never leave a disc in the player's disc holder for a long period of time.

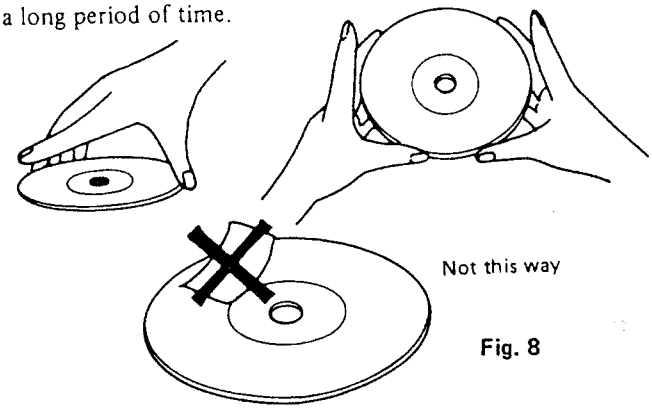


Fig. 8

- **Cleaning Compact Discs**

Before playing a disc wipe off the playing surface with a soft cloth to remove dust and other soil. Wipe the surface in straight lines from the center of the disc outward, not in a circular motion as you would with a phonograph record.
Do not use benzene, chemical cleansers or phonograph record cleaning solutions to clean Compact Discs. Also avoid static electricity prevention solutions since they can damage the surface of Compact Discs.

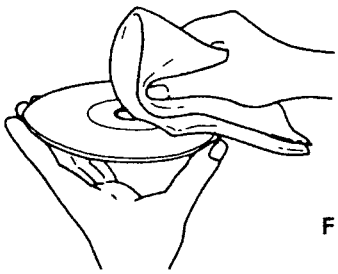


Fig. 9

Problems Caused by Dew
Dew can form inside a Compact player when it is brought from a cold environment into a warm room, when a room is rapidly heated and if a player is left in a humid environment.
This dew can prevent the laser pickup from reading the data contained in the pits in the disc surface. If the player does not operate properly because of dew, remove the disc and leave the player's power switch on for about one hour to remove all moisture.

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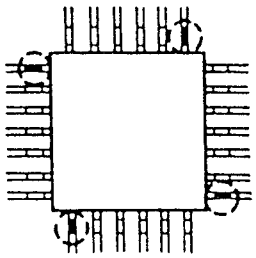

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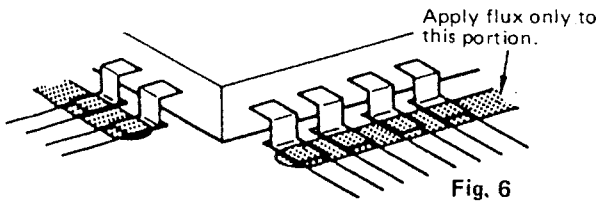

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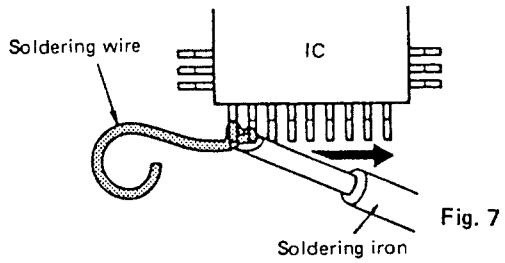

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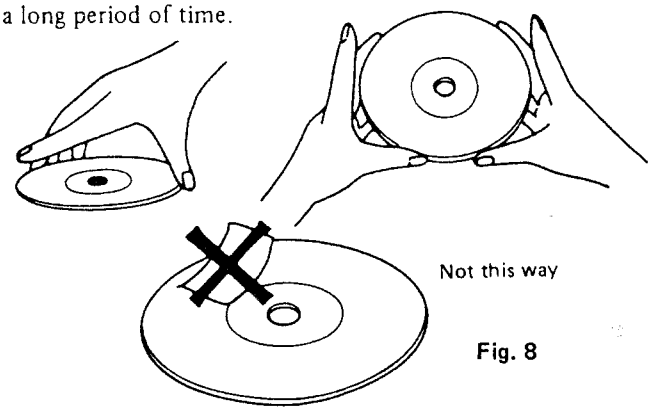

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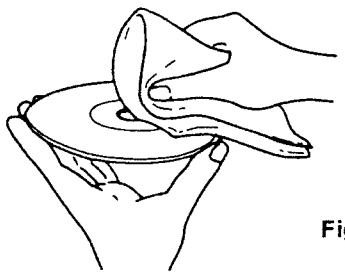

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PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMMISION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

Laser Diode Properties

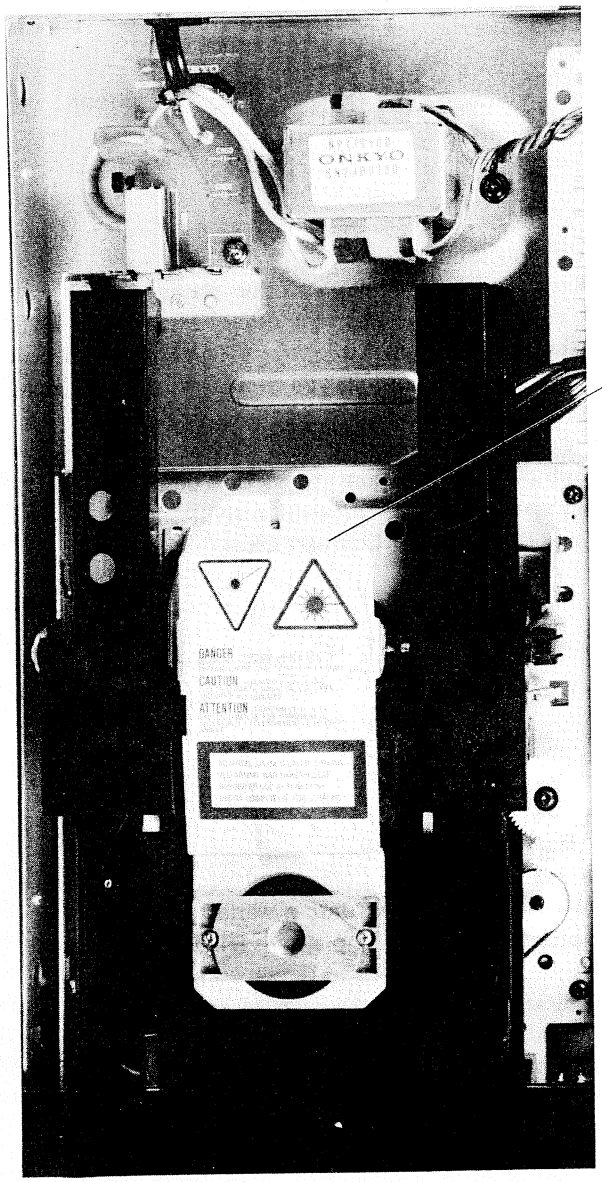
- Material: GaAS/GaAlAs
- Wavelength: 780nm
- Emission Duration: continuous
- Laser output: max. 0.5mW*

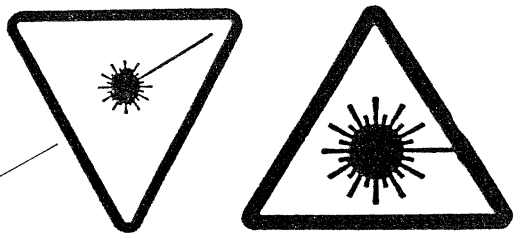
  *This output is the value measured at a distance about 1.8mm from the objective lens surface on the Optical Pick-up Block.

LASER WARNING LABEL

The label shown below are affixed.

1. Warning label





DANGER —INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCK FAILED OR DEFEATED. AVOID DIRECT EXPOSURE TO BEAM.

CAUTION —HAZARDOUS LASER AND ELECTROMAGNETIC RADIATION WHEN OPEN AND INTERLOCK DEFEATED.

ATTENTION —RAYONNEMENT LASER ET ELECTROMAGNETIQUE DANGEREUX SI OUVERT AVEC L'ECLENCHEMENT DE SECURITE ANNULE.

SN293 60911

ADVARSEL: USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSAF-BRYDER ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.

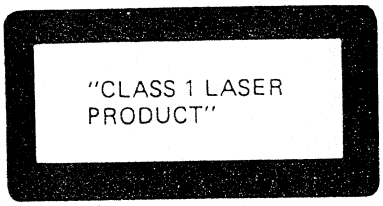
Photo 1

2. Class 1 label

This label is located on the back panel.

Photo 2

ADVARSEL



Denne mærkning er anbragt på apparatets højre side og indikerer, at apparatet arbejder med laserstråler af klasse 1, hvilket betyder, at der anvendes laserstråler af svageste klasse, og at man ikke på apparatets yderside kan blive udsat for utilladelig kraftig stråling.

APPARATET BØR KUN ÅBNES AF FAGFOLK MED SÆRLIGT KENDSKAB TIL APPARATER MED LASERSTRÅLER!

Indvendigt i apparatet er anbragt den her gengivne advarselsmærkning, som advarer imod at foretage sådanne indgreb i apparatet, at man kan komme til at udsætte sig for laserstråling.

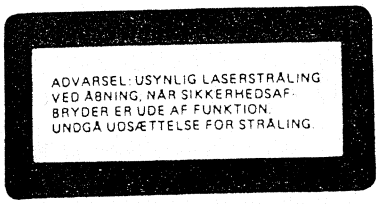


Fig. 10

VAROITUS! Laite sisältää laserdiodin, joka lähettää (näkymätöntä) silmille vaarallista lasersäteilyä.

CAUTION ON REPLACEMENT OF PICK-UP

The laser diode in the optical pick-up block is so sensitive to static electricity, surge current and etc. that the components are liable to be broken down or its reliability remarkably deteriorated.

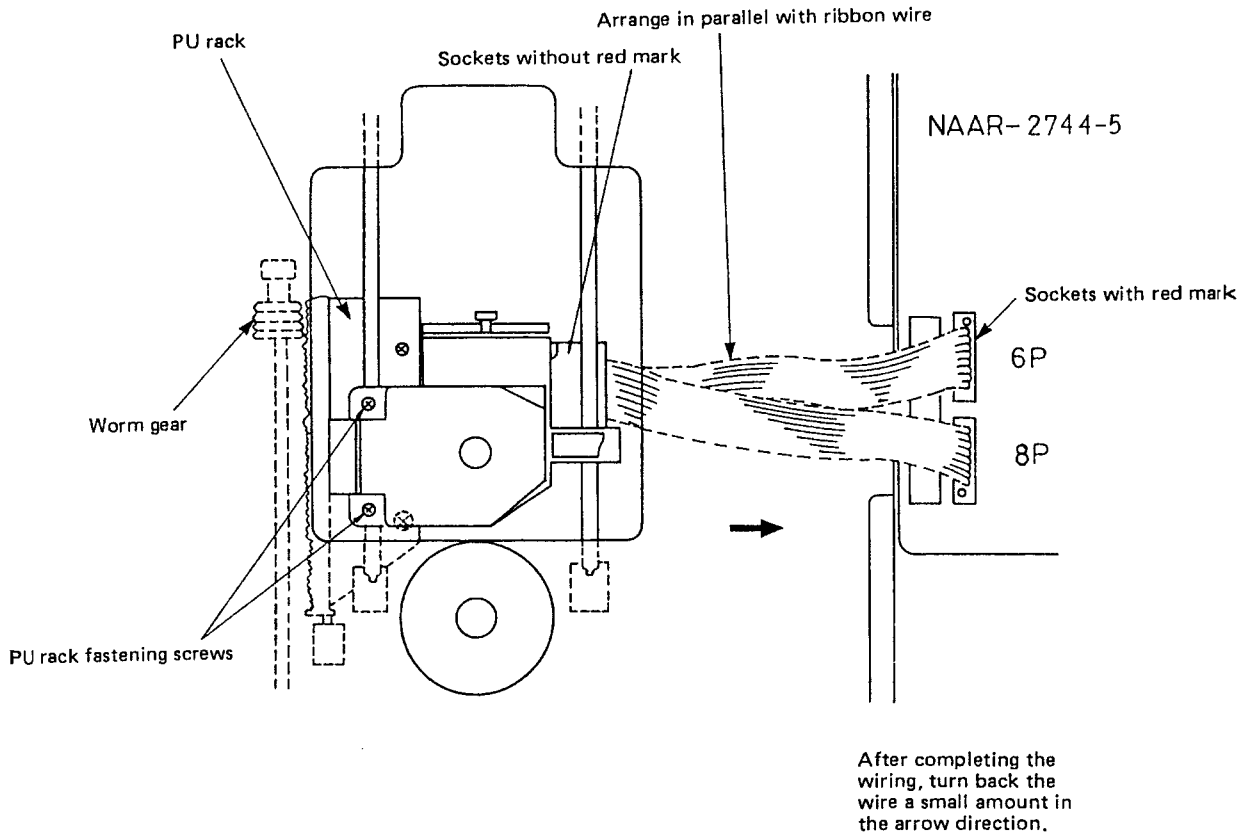
During repair, carefulley take the following precautions. (The following precautions are included in the service parts).

PRECAUTIONS

1. **Ground for the work-desk.**
   Place a conductive sheet such as a sheet of copper (with impedance lower than $10^6\,\Omega$) on the work-desk and place the set on the conductive sheet so that the chassis.
2. **Grounding for the test equipment and tools.**
   Test equipments and toolings should be grounded in order that their ground level is the same the ground of the power source.
3. **Grounding for the human body.**
   Be sure to put on a wrist-strap for grounding whose other end is grounded.
   Be particularly careful when the workers wear synthetic fiber clothes, or air is dry.
4. **Select a soldering iron that permits no leakage and have the tip of the iron well-grounded.**
5. **Do not check the laser diode terminals with the probe of a circuit tester or oscilloscope.**

Cautions when attaching the optical pickup

1) Insert the pickup into the 8-pin socket in accordance with the red mark direction. If the pickup is inserted in reverse, the optical pickup will be damaged.
2) Arranged the pickup leads in accordance with the below view.
3) Use ribbon wire ties to separated the leads.



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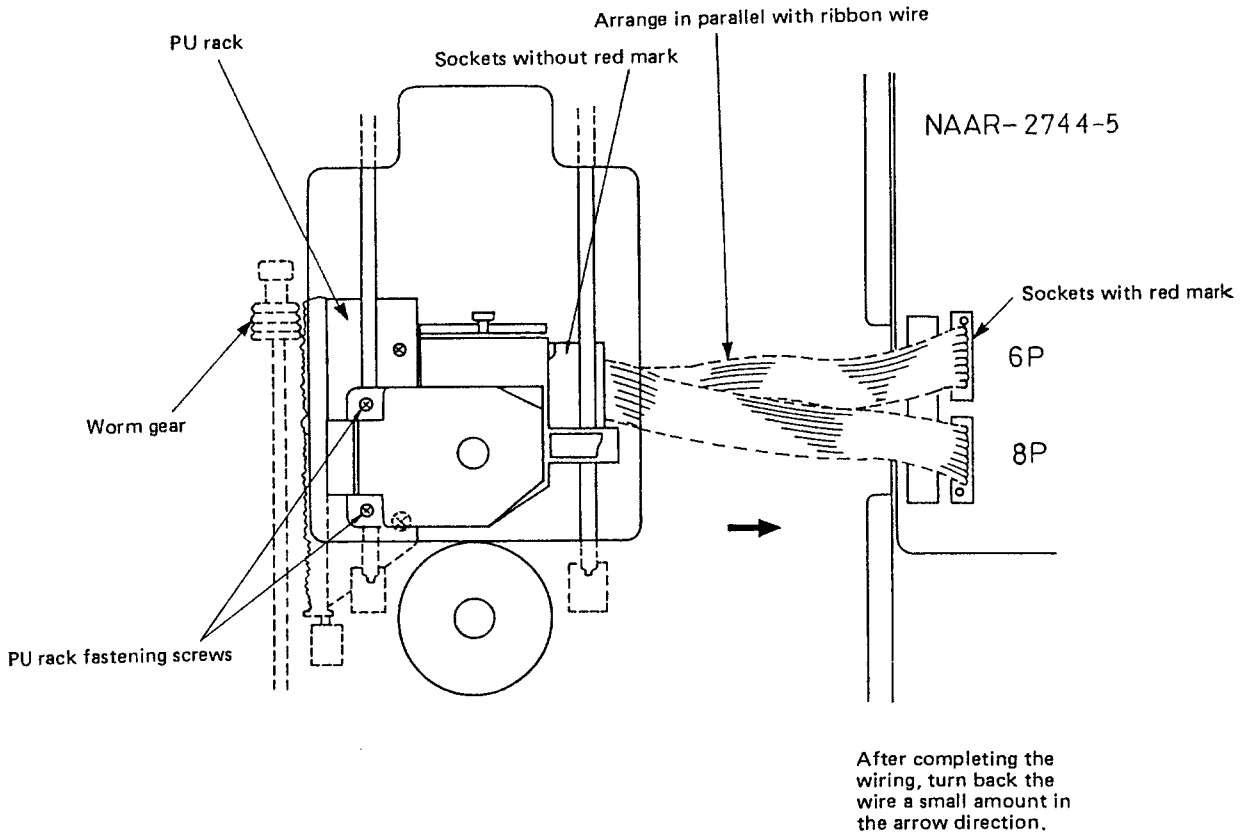
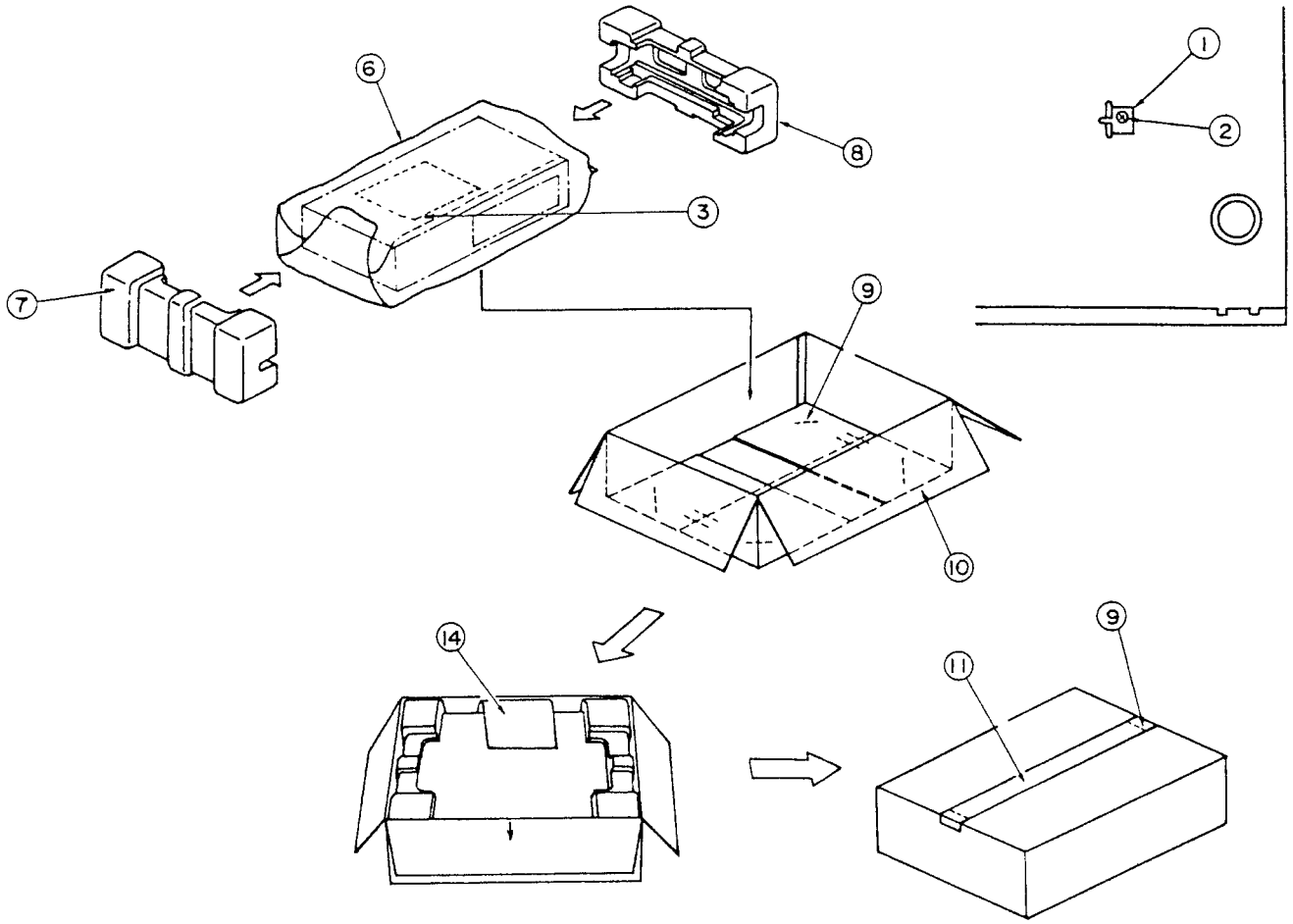
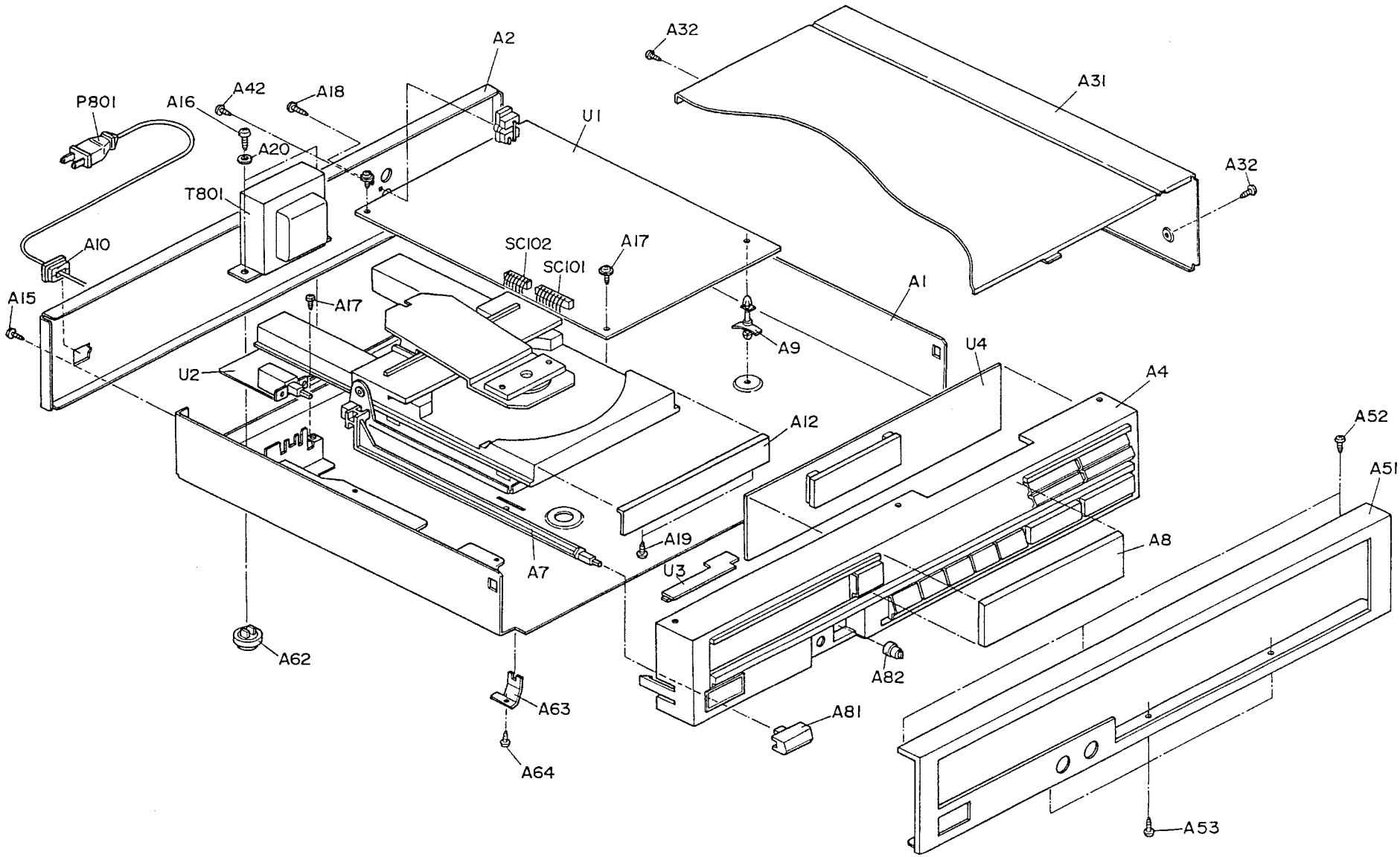


PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	27141102	Locking plate
2	834430068	3TTS+6B(BC), Tapping screw
3	29360873	Label, locking plate
6	29100036A	550X850mm, poly-vinyl bag
7	29091110A	Pad L
8	29091111A	Pad R
9	282301	Sealing hook
10	29051505	Master carton box <Black model>
	29051506	Master carton box <Silver model>
11	260012	Damplon tape
14	Accessary bag ass'y	
	2010098	Connection cord
	241072	RC-103C, Remote control unit
	3010054	UM-3, Two batteries
	29341138	Instruction manual
	29100097	350X250mm, Poly-vinyl bag
	29365020	Warranty card

EXPLODED VIEW



PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
A1	27100117A	Chassis
A2	27120972	Back panel
A4	27110350A	Front bracket ass'y <S>
	27110351A	Front bracket ass'y <B>
A7	27273065	Joint
A8	28191398	Clear plate
A9	27190011	Holder
A10	27300750	Strainrelief
A12	27210783	Panel, Door <S>
	27210785	Panel, Door <B>
A15	834430068	3TTS+6B(BC) Tapping screw
A16	830440089	4TTC+8C(BC), Tapping screw
A17	831130088	3TTW+8B, Tapping screw
A18	834430108	3TTS+10B(BC), Tapping screw
A19	833430080	3TTP+8P(BC), Tapping screw
A20	870065	Special washer
A21	834230108	3TTS+10B(Ni), Nickel screw
A22	28175138	Insulated plate
A31	28184348	Top cover <S>
	28184349	Top cover <B>
A51	27210834	Front panel <S>
	27210836	Front panel <B>
A52	833430080	3TTP+8P(BC), Tapping screw
A53	834430068	3TTS+6B(BC), Tapping screw
A62	27175130	Leg
A63	27141102	Locking plate
A64	834430068	3TTS+6B(BC), Tapping screw
A81	28322878	Knob, power <S>
	28322879	Knob, power <B>
A82	28322772	Knob, level <S>
	28322437	Knob, level <B>
P801	253127 or 253129	AS-CEE, Power supply cord
SC101	2000666	NSAS-16P-622, Socket
SC102	2000667	NSAS-12P-623, Socket
T801	2300181	NPT-950G, Power transformer
U1	1H011544-5A	NAAR-2744-5a, Main circuit pc board ass'y
U2	1H008550-2	NAPS-2750-2, Power supply circuit pc board ass'y
U3	1H012568-1	NAAF-2968-1, Headphone terminal pc board ass'y
U4	1H012511-2	NADIS-2911-2, Display circuit pc board ass'y
	29360911	Label LASER
	29360687	Label CLASS 1

NOTE: <S>: Only Silver model
<B>: Only Black model

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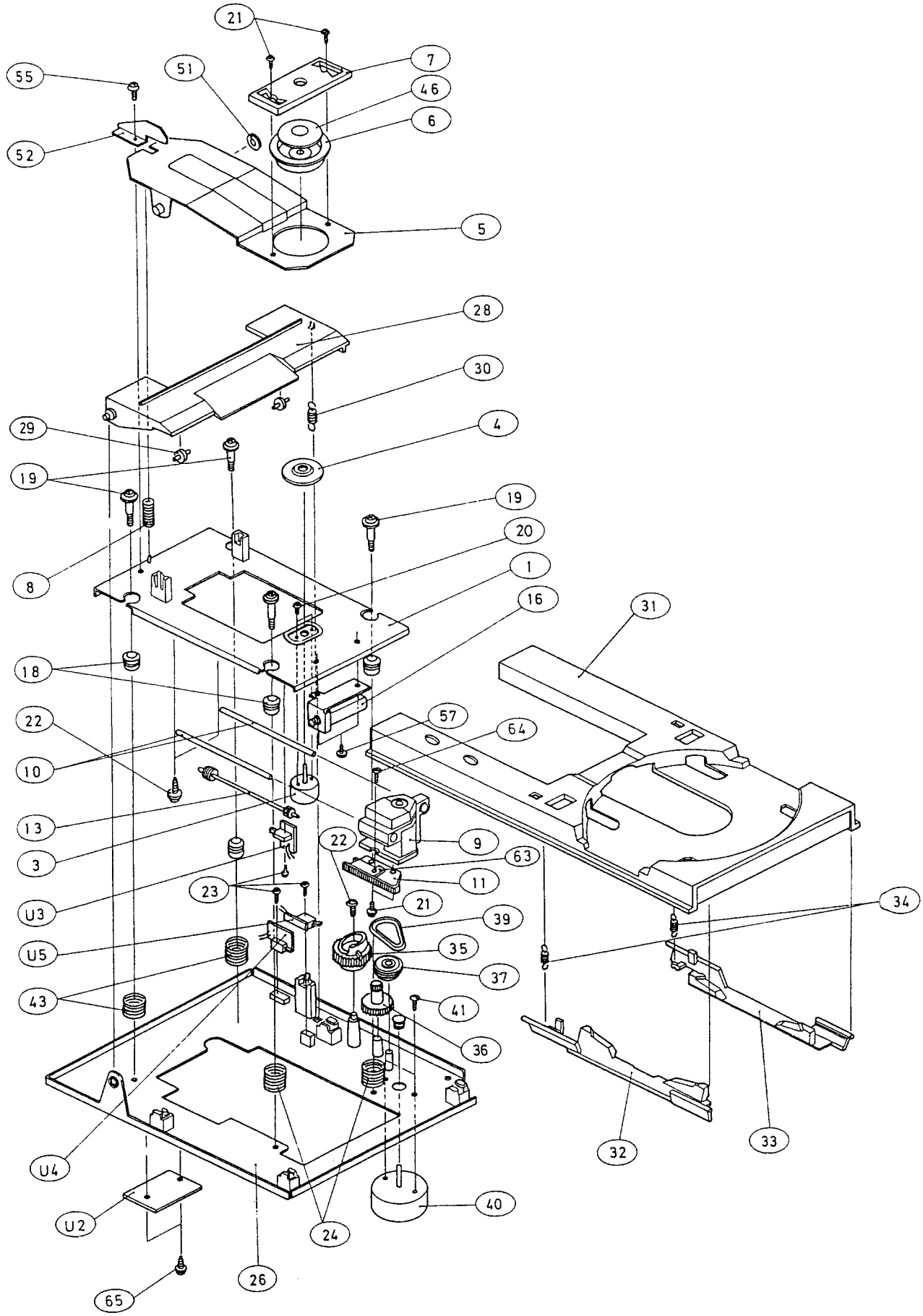
MECHANISM EXPLODED VIEW



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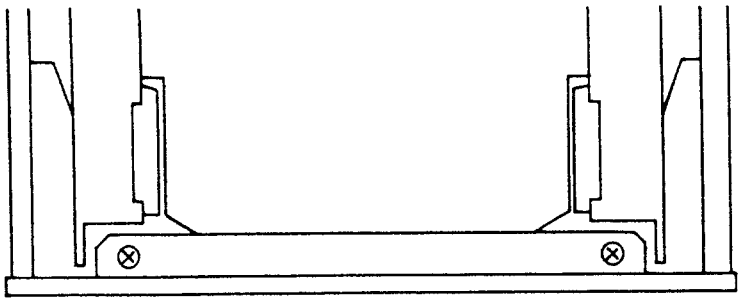
1	27100098F	Chassis
3	24502203	Spindle motor
4	27300889A	Turntable platter
5	27300847B	Arm P
6	27300848A	Cap CH
7	27300849B	Holder, cap
8	27180327	Spring
9	241073A	MLP-8, Optical pick-up
10	27260222	Shaft
11	27300850B	Rack PU
13	10498902	Shaft ass'y
16	10498903	Motor ass'y
18	27300854A	Cushion rubber
19	801364	Special screw
20	82142003	2P+3F(BC), Pan head screw
21	82112605	2.6P+5F, Pan head screw
22	831430100	3TTW+10P(BC), Tapping screw
23	833420108	2TTP+10B(BC), Tapping screw
24	27180319	Spring
26	27100099G	Chassis L
28	27300855E	Arm L
29	27185019A	Roller
30	27180310B	Spring
31	27300861C	Disc tray
32	27300900	Disc lifter L
33	27300901	Disc lifter R
34	27180311C	Spring
35	27300856B	Cam gear
36	27300857B	Flat wheel
37	27300858	Pulley gear
39	27300860	Belt
40	10498901	Motor ass'y
41	82142604	2.6P+4F(BC), Pan head screw
43	27180320	Spring
44	833430080	3TTP+8P(BC), Tapping screw
46	27270206	Spacer
51	27270203	Φ10, Spacer
52	27141098	Bracket, holder
55	834430068	3TTS+6B(BC), Tapping screw
57	834426068	2.6TTS+6B(BC), Tapping screw
63	27141105A	Bracket
64	82112606	2.6P+6F, Pan head screw
65	833430080	3TTP+8P(BC), Tapping screw
U3	10498544-1	NATRM-2844-1, Terminal pc board ass'y
U4	10498545-1	NASW-2845-1, Start switch pc board ass'y
U5	10498546-1	NASW-2846-1, Open switch pc board ass'y
U6	10498547-1	NASW-2847-1, Close switch pc board ass'y

DISASSEMBLING PROCEDURES

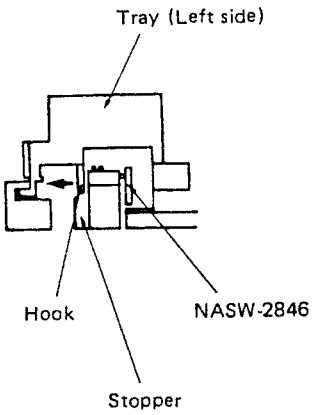
1. Tray panel removal

1) Remove the tray with pressing the OPEN/CLOSE button.
2) Turn the unit over and put it on the soft cloth.
3) Remove the two screws from the tray.



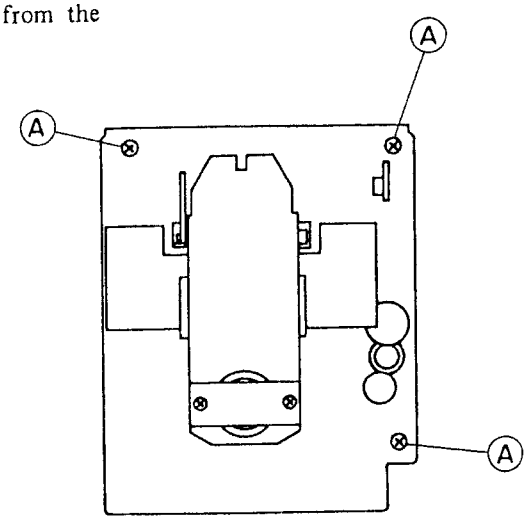
2. Tray removal

1) Remove the top cover.
2) Open the tray with pressing the OPEN/CLOSE button.
3) Release the hook of tray from stopper and pull the tray out.



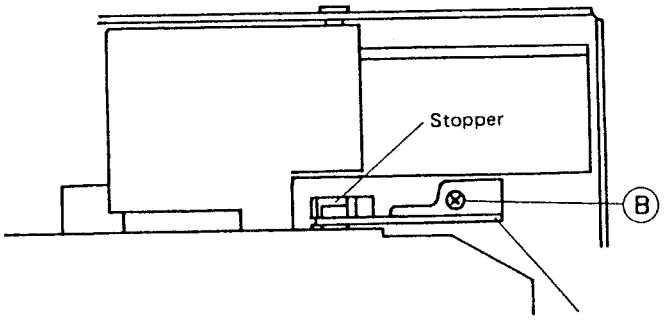
3. Mechanical chassis removal

1) Remove the top cover and tray.
2) Remove the three screws A from the mechanical chassis.
3) Remove the two connectors (P101 & P102) from the main pc board.
4) Pull the mechanical chassis out carefully.
5) Remove the two connectors (P201 & P202) from the terminal pc board.



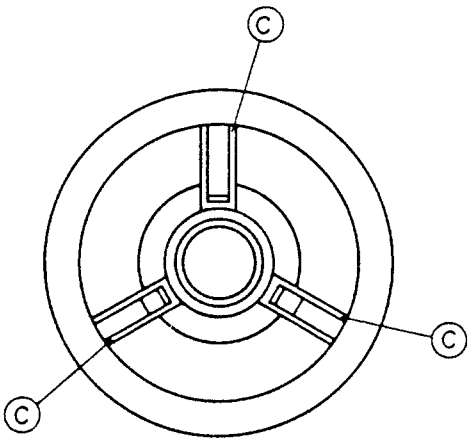
4. Arm P removal

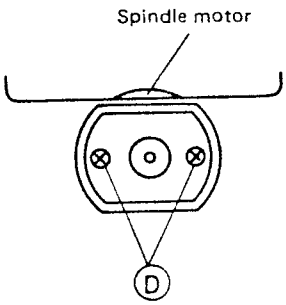
1) Remove the top cover.
2) Remove a screw B from the bracket, holder.
3) Remove the arm P from the stopper.



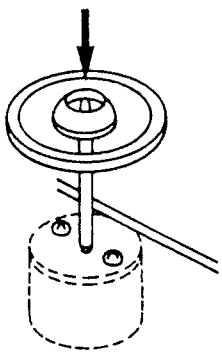
5. Replacing the spindle motor and turntable platter

1) Remove the tray and arm P.
2) Cut the points C of turntable platter with the pincers and pull it out from the shaft of spindle motor.
3) Remove the two screws D from the mechanical chassis.

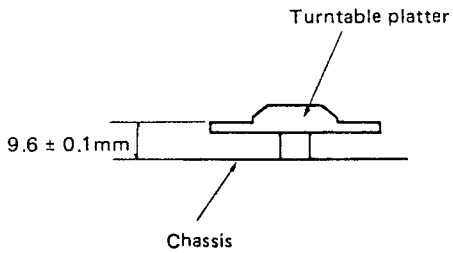




Press the center of turntable platter and insert the turntable platter in the shaft of spindle motor.



Height of turntable platter.



CIRCUIT DESCRIPTIONS

1. Focus Servo Circuit

The focus servo ensures that the laser beam emitted by the optical pickup is always focused on the reflective surface of the disc. It does this by moving the optical pickup's objective lens in response to oscillations in the disc surface.

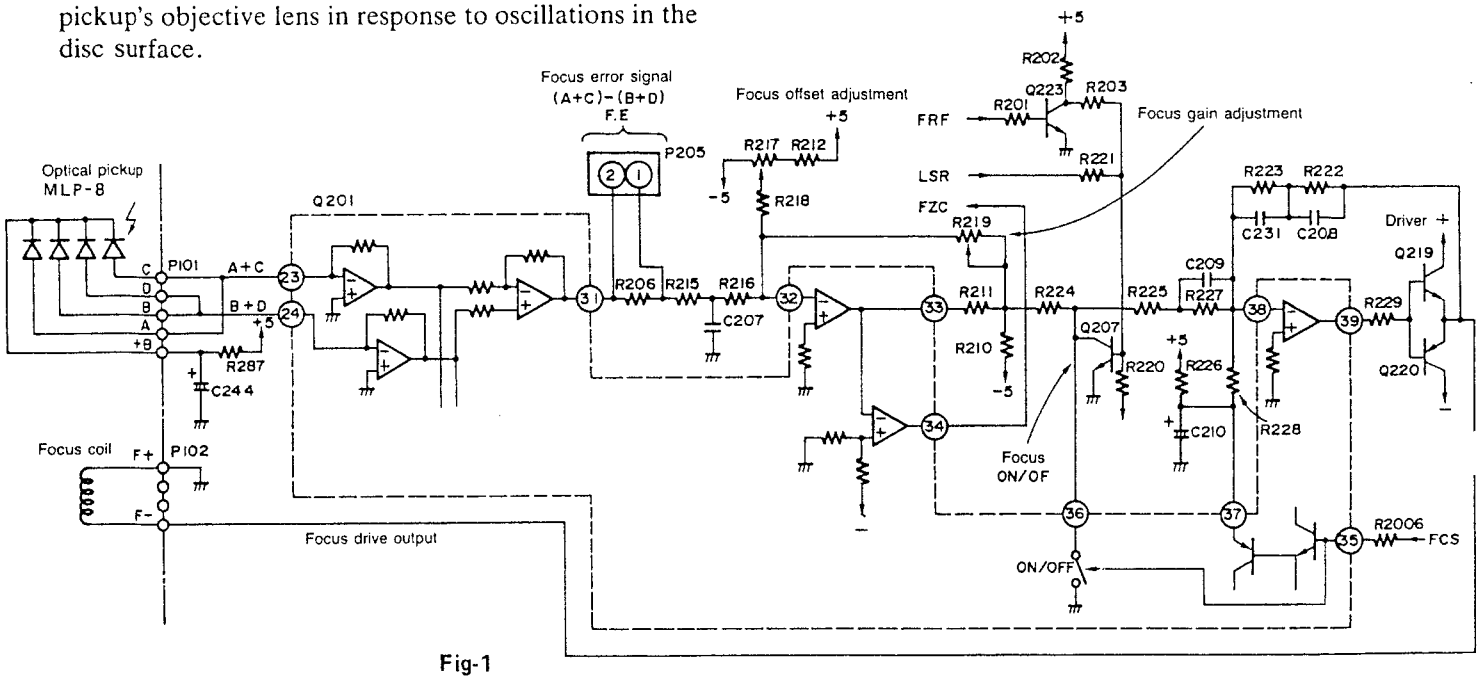


Fig-1

1-1. Focus Error Detector

The detector obtains the difference between the signals produced by the diagonal elements of a four-section photodiode housed in the pickup and utilizes an astigmatic method to detect focusing errors.

FE (focus error) = (A + C) − (B + D)

(A + C) and (B + D) are input into pin 23 and pin 24 of Q201 respectively. The FE signal is calculated by the three opamps in Q201 and output via pin 31.

1-2. Phase Correctors – Drivers

The focus error signal is relayed from Q201 pin 31 to pins 32, 33, 38 and 39 in succession. Then, after passing through drivers Q219 and Q220, it is fed back to the focus coil of the pickup.

C207, C209 and C208 are phase correctors which enhance the servo's stability. Semi-fixed resistors R217 and R219 are used to regulate offset and gain in the servo circuitry. Q207 and the switch in pin 36 turn the servo loop on and off. Control is maintained by means of the following three signals: the FCS signal sent from Q202, the FRF signal which indicates that the servo is engaged and the LSR (laser) signal sent from microprocessor Q204.

1-3. FZC (Focus Zero Cross) and FCS (Focus Search) Circuits

The focusing servo's capture range is only approximately 10μm, so, when the objective lens is being moved up or down, the above-mentioned servo on/off switch must be controlled to close the loop when the point of focus of the laser beam is positioned precisely. When a focus search command is received from the microprocessor, the LSR signal switches to LOW and a laser beam is emitted (see fig. 2). At the same time, the FCS signal switches to HIGH. C210 and R226 integrate the FCS signal creating a chopping wave, and raise the objective lens into position.

As the laser beam approaches the point of focus, the FRF signal (see fig. 2) changes to HIGH, and the FE signal builds up (+) electrical potential which falls when optimum focus is reached. This comparator's output FZC signal is output from pin 34 of Q201. According to this timing, FCS changes to LOW, and Q207 and the switch of pin 36 shut off, closing the servo loop. Fig. 2 illustrates the timing. The dotted lines show the waveforms produced by focus capture errors.

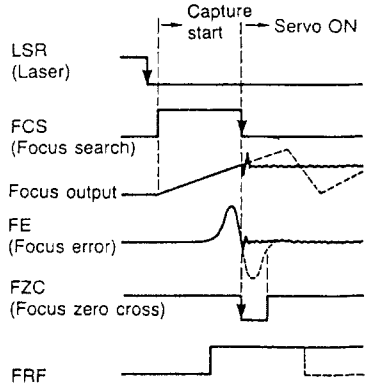


Fig-2

2. Tracking servo

This control circuit moves the objective lens radially to keep the laser beam precisely centered in the tracks on the disc surface (which are only 1.6μm wide).

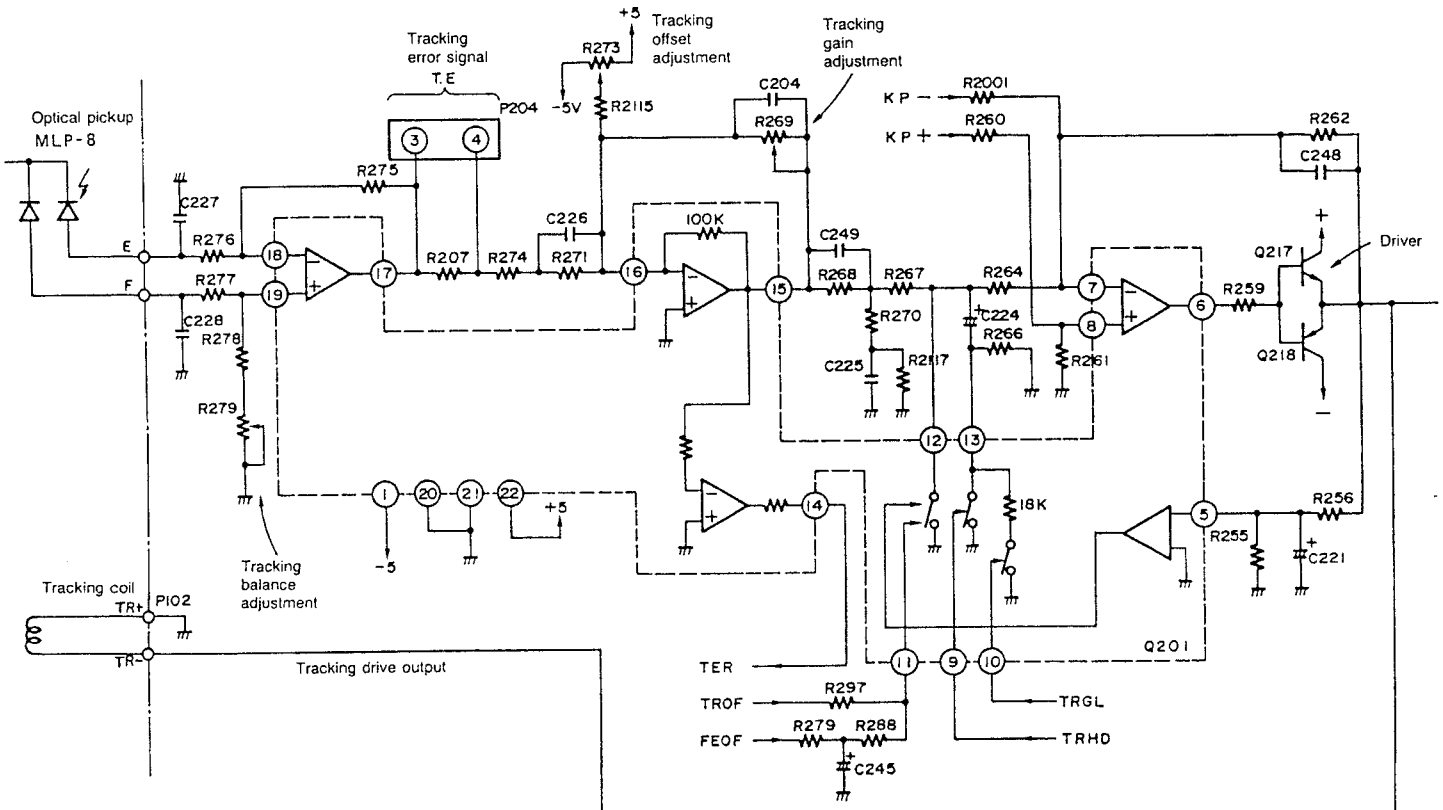


Fig-3

2-1. Tracking Error Sensor

This unit uses a three-beam laser pickup. The error signal is obtained from the difference between the E and F output from both sides of a four-section photodiode housed in the pickup.

T.E. (tracking error) = F − E

The E and F signals are input into pins 18 and 19 of Q201, the difference is obtained by an internal opamp, and the T.E. signal is output from pin 17.

2-2. Phase Correctors – Drivers

The tracking error signal is relayed from Q201 pin 17 to pins 16, 15, 7 and 6 in succession. After passing through drivers Q217 and Q218 it drives the tracking coil of the pickup. C226, C249, C225 and C224 are capacitors which perform phase corrections. Balance, offset and gain are regulated by semi-fixed resistors R279, R273 and R269 respectively.

The switches incorporated in pins 12 and 13 of Q201 turn the servo on and off and switch the high frequency range loop gain on and off, thereby helping to stabilize transient operation during access times. The timing of these switches is determined by the input into pins 9 – 11 of Q201. The commands are as follows:

TROF (tracking OFF) FEOF (feed OFF)
TRGL (tracking gain low) TRHD (tracking high down)

Signals are output from Q202 in response to commands from microprocessor Q204.

2-3. TER circuit

The TER signal is one of the sensors that determines the switch timing mentioned above. It is produced by running the tracking error signal output from pin 15 through a comparator at the ground level and then output through pin 14.

2-4. Track Kick Circuit

This circuit is used to move the laser beam to a target pit over relatively short distances (approximately 1 – 100 tracks) during such operations as disc access and cue review. In conjunction with the on/off switching discussed above, it sends positive and negative "kick pulses" (KP+ and KP−) to pins 7 and 8, thereby shifting the tracking coil by the desired amount.
The timing is determined by signals such as the TER signal and the HFD signal (see below). Fig. 4 illustrates the timing during a typical "kick" operation (forward).

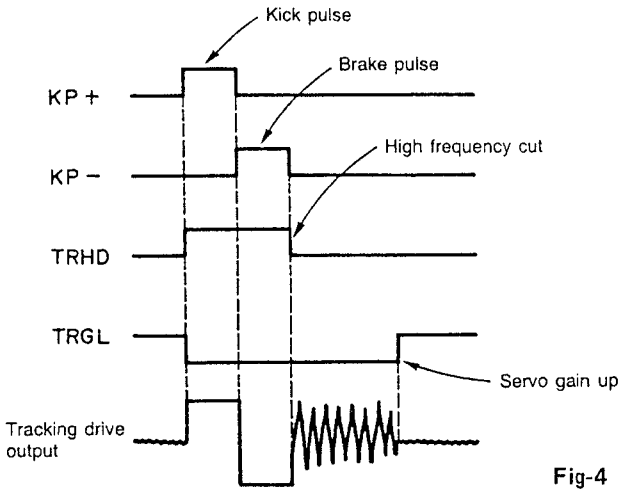


Fig-4

3. HF (RF) Amp

The HF (RF) amplifier block amplifies the HF (RF) data encoded on the disc (in other words the entire output from the four-section photodiode) and sends it to the processing circuit block. In addition, it constantly checks the status of the servo and detects the signals which determine timing.

H.F. (R.F.) = A + B + C + D ← Eye-Pattern

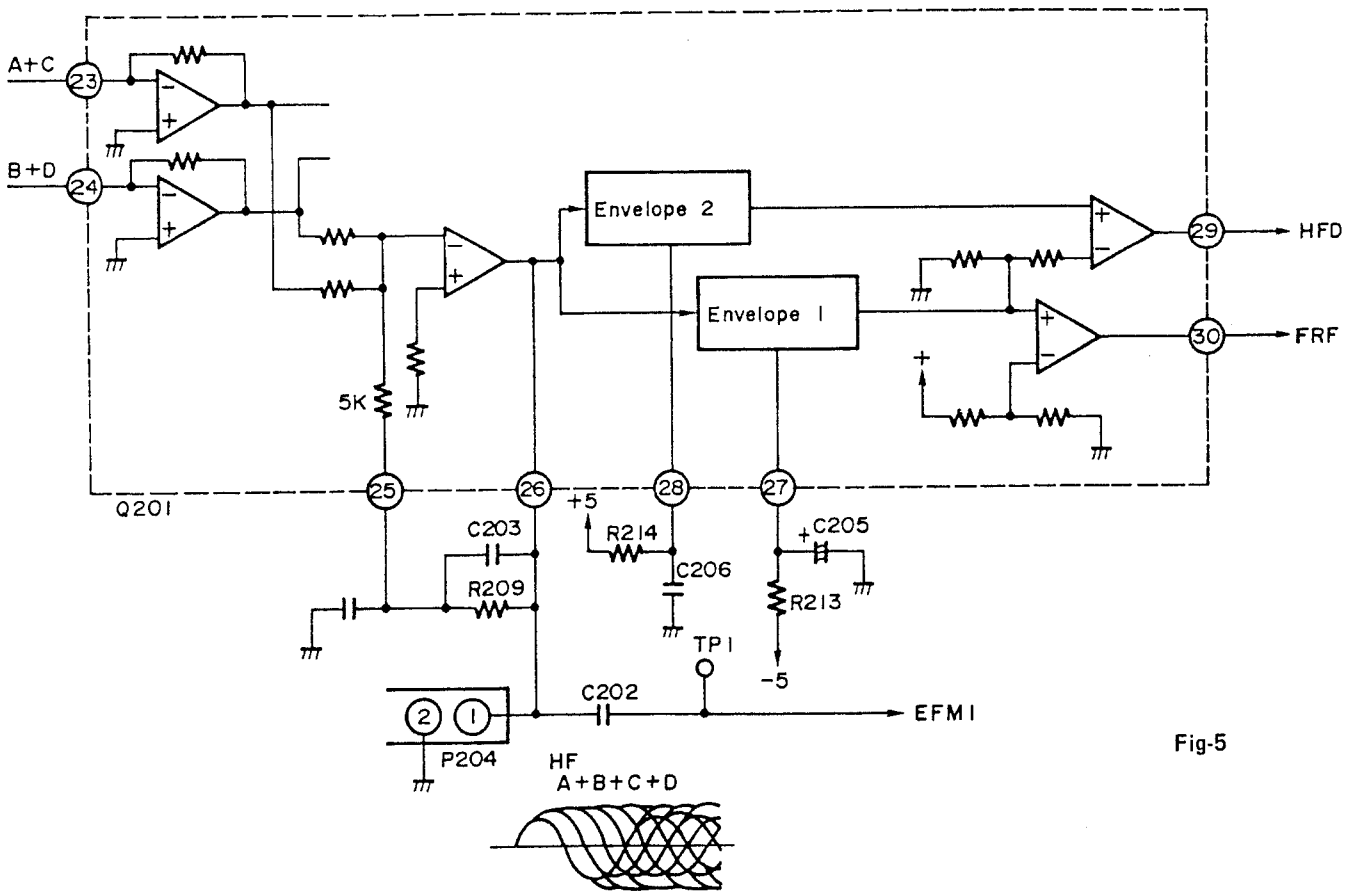


Fig-5

3-1. HF Amp

The A + C and B + D signals are input from pins 23 and 24 of Q201. They are added together by an opamp and the resulting signal (the HF signal) appears at pin 26. The HF signal is then passed through C202 and sent to the EFMI terminal of Q202 for signal processing.

3-2. HFD and FRF Signals

The HF signal is input into C205 and C206, two envelope detection circuits with different time constants. The output is put through a comparator at a certain level and the HFD and FRF signals are then output via pins 29 and 30. The FRF signal indicates that focus in on; it is HIGH when focus is on. The HFD (HF detector) detects such things as the flat sections between pits and scratches on the disc surface. Together with the TER signal, it determines switching timing during disc access, etc.

4. Slide Motor (Feed Motor) Circuit

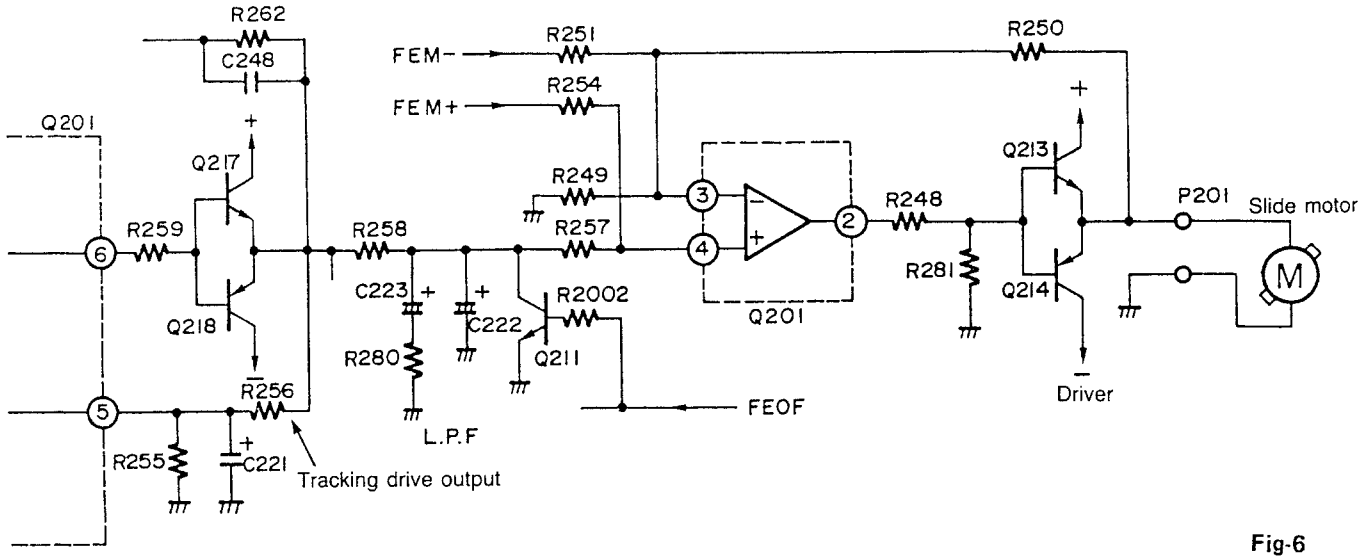


Fig-6

This servo circuit moves the entire pickup assembly from the disc's hub to its outer edge, ensuring that the objective lens stays close to the optical axis.
C222, C223, etc. remove low-frequency elements from the tracking drive's output. It then passes successively through pins 4 and 2 of Q201 and then drives the motor via drivers Q213 and Q214.
Q211 is the transistor that turns the slide servo on and off. It is controlled by the FEOF (feed off) signal sent from Q202.
Motor fast forward and reverse are initiated by FEM− (feed motor −) and FEM+ (feed motor +) signals input into pins 3 and 4 of Q201 for smooth disc access.

5. Spindle Motor Servo

This servo consists of a PLL circuit which extracts the clock signal from the HF signal the pickup reads from the disc and a circuit which controls the spindle motor based on this clock signal.

5-1. PLL Circuit

The PLL circuit consists of VCO, LPF and a phase comparator in Q202 as shown in fig. 7.
The 8.64MHz VCO oscillator output is divided in half inside Q202. The phase of the HF signal and the waveformshaped EFM signal edge are compared and the result output through pin 4.
When PLL is locked, LPF output from pin 7 of Q210 is approximately 2.5V and the SYEQ (sync equal) terminal (Q202, pin 10) changes to HIGH.

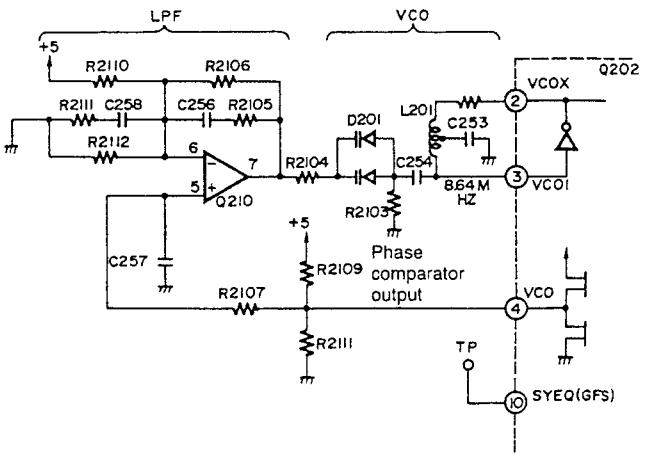


Fig-7

5-2. Spindle Motor Circuit

The spindle motor is controlled by DM+ (disc motor +) and DM− (disc motor −) commands output from pins 11 and 12 of Q202. Two opamps perform phase correction and amplify the signals which are then sent to the spindle motor via drivers Q215 and Q216.

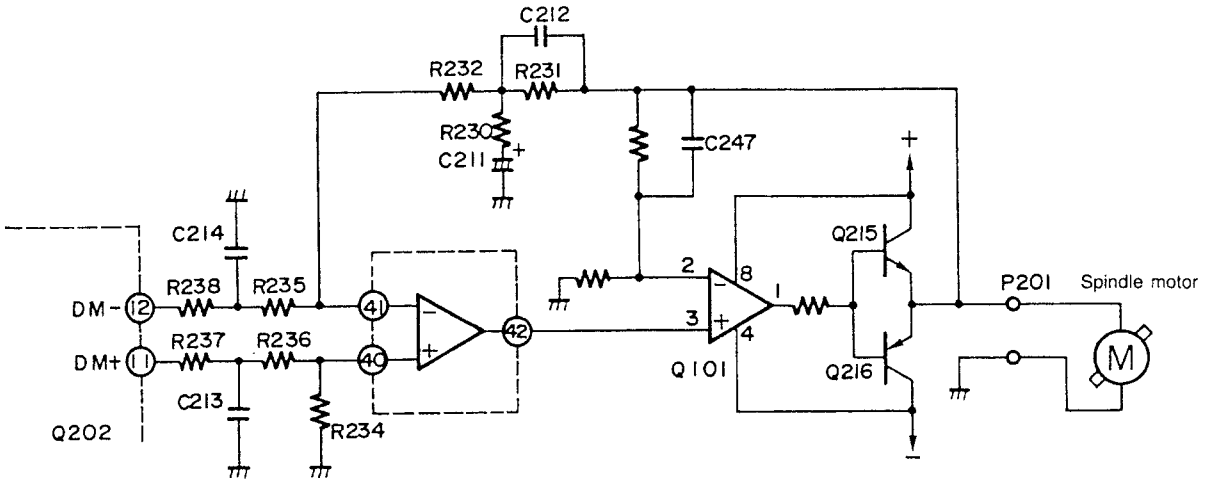


Fig. 8

6. HF Signal Waveform-shaping Circuit

This circuit shapes the HF signal and converts it into a binary value. However, since asymmetry (i.e. lack of symmetry between the top and bottom of the HF signal which can adversely affect the DC balance) caused by dispersion during disc manufacture cannot be eliminated by AC linking alone, DC components from the EFM (eight to fourteen modulation) signal are fed back after shaping for slice level processing.
The slice level output from Q210 pin 1 is approximately 2.5V during normal operation.

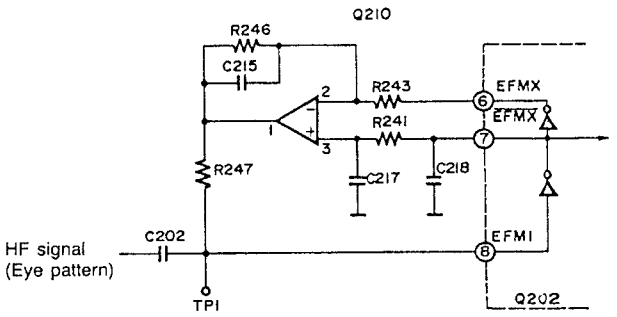


Fig. 9

7. APC Circuit

The laser diode is extremely temperature sensitive. For this reason, the APC (auto power control) circuit, which continuously monitors the laser output and feeds it back, is essential.
Negative feedback control is performed on the output signal from the monitor diode inside the laser pickup by Q101. Q103 switches the laser on and off in response to the LSR (laser) command from the microprocesor.

8. Microprocessor (Q204) Peripheral Circuit

8-1. Display Controller (Q204)

The dynamic scan technique used by the display controller is driven directly by 8-digit output from pins 5 – 12 of Q204 and 8-segment data output from pins 17 – 20 and 22 – 25. The duration of each digit is approximately 1ms with cycles of 1 × 8 = 8 ms (125Hz).

8-2. Key Input Processor (Q204)

The processor uses the display digits as is without alteration. Q204 uses a 4 × 3 matrix configuration and accepts key input through pins 26 – 29 (regular logic).
This matrix also controls three remit switches (open/close, pickup reset) as well as timer switches, etc.

8-3. Remote Control Signal Processing (Q402, Q204)
Output from infrared sensor U401 is sent to pin 15 of Q402 where noise from sources such as fluorescent lights is removed. Then it is output from pin 14 and sent to Q203 pin 37. Fig. 10 shows a typical remote control waveform.

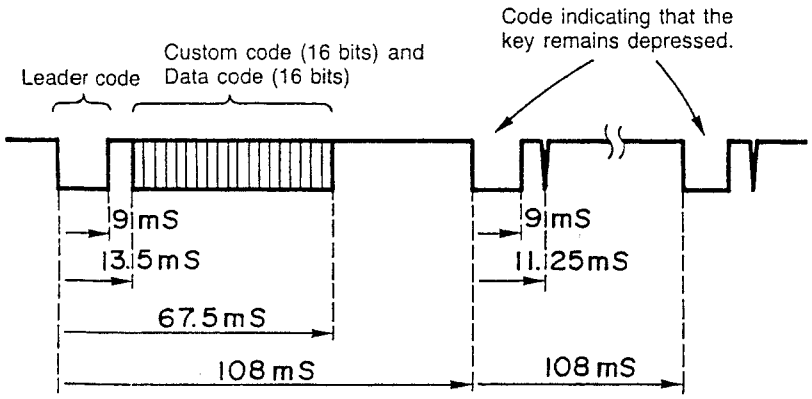
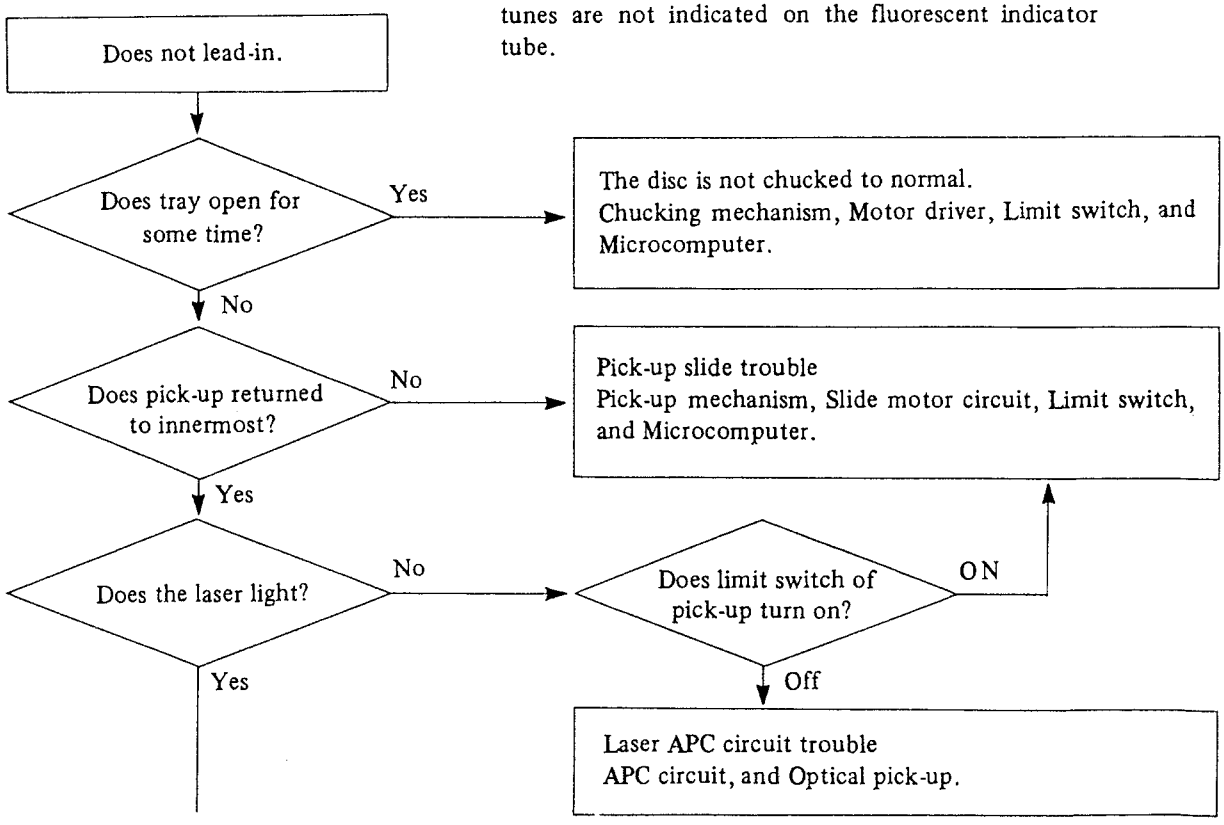
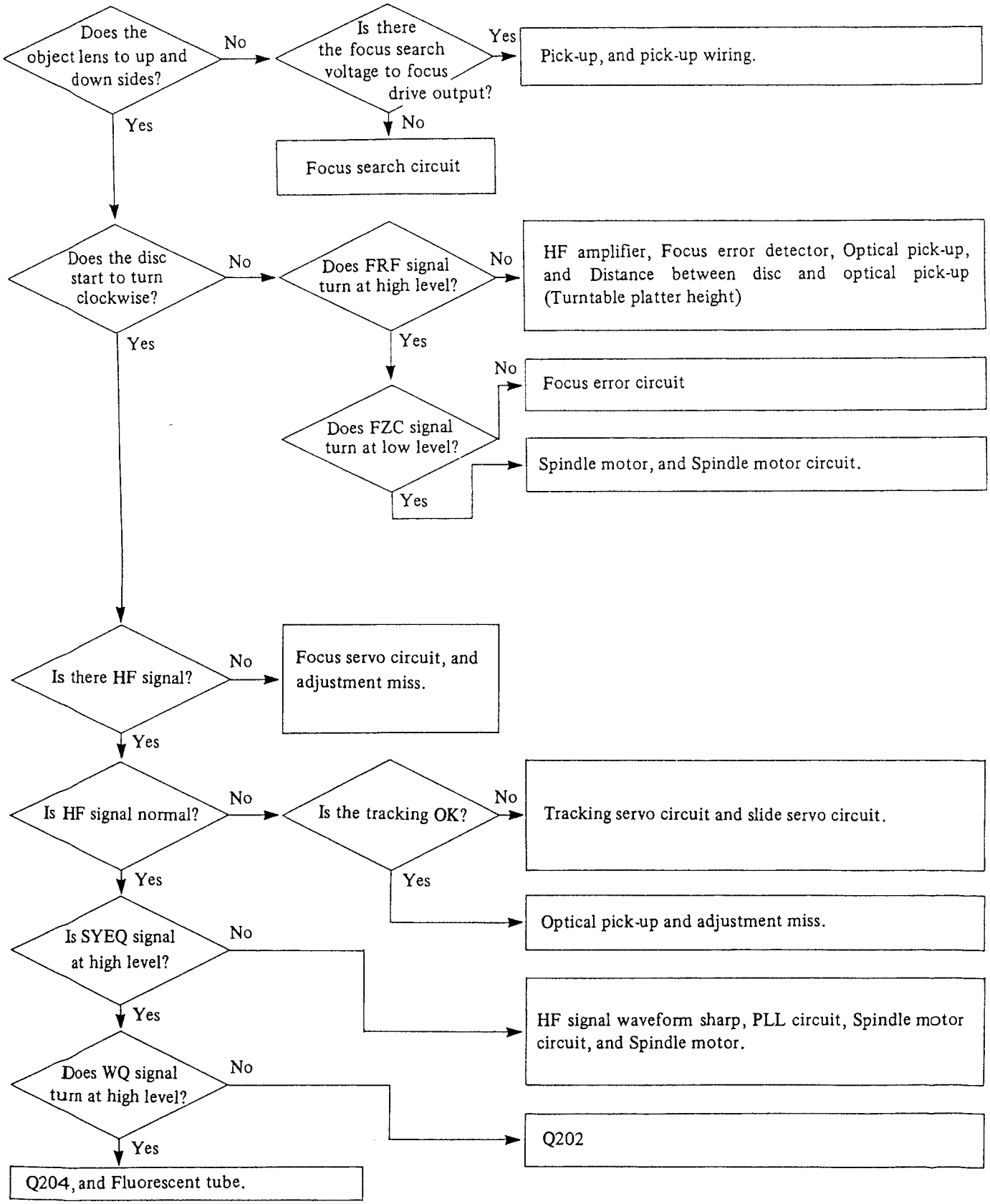


Fig. 10

TROUBLE SHOOTING GUIDE

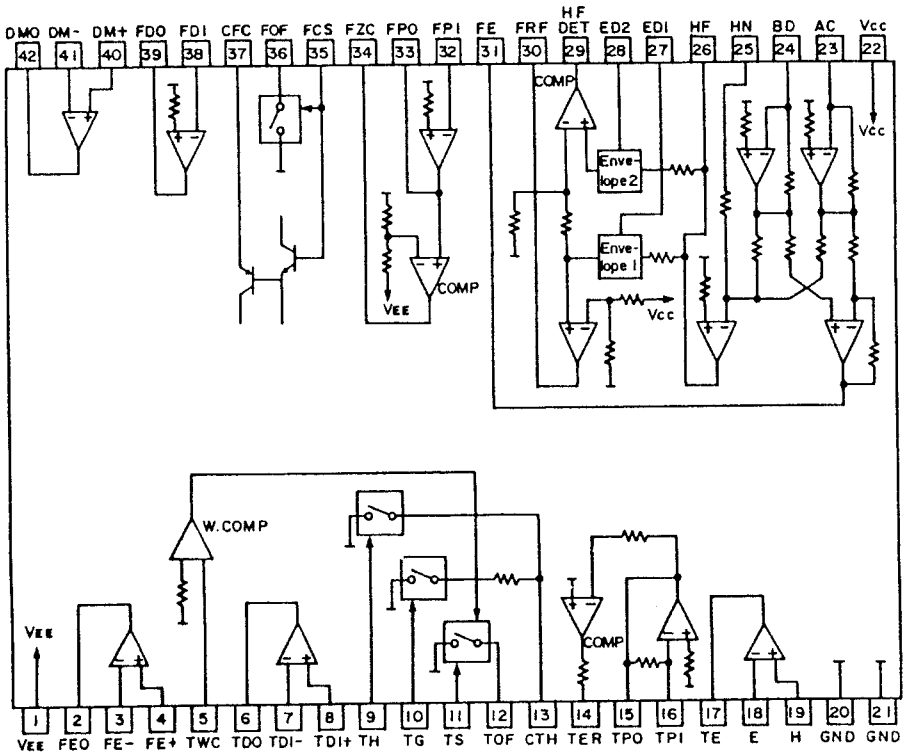
Load the disc on the tray, press OPEN/CLOSE key and close the tray. But, total play time and total number of tunes are not indicated on the fluorescent indicator tube.




Does the object lens to up and down sides?
No
Is there the focus search voltage to focus drive output?
Yes
Pick-up, and pick-up wiring.
No
Focus search circuit
Yes
Does the disc start to turn clockwise?
No
Does FRF signal turn at high level?
No
HF amplifier, Focus error detector, Optical pick-up, and Distance between disc and optical pick-up (Turntable platter height)
Yes
Yes
No
Focus error circuit
Does FZC signal turn at low level?
Spindle motor, and Spindle motor circuit.
Yes
Is there HF signal?
No
Focus servo circuit, and adjustment miss.
Yes
Is HF signal normal?
No
Is the tracking OK?
No
Tracking servo circuit and slide servo circuit.
Yes
Yes
Optical pick-up and adjustment miss.
Is SYEQ signal at high level?
No
Yes
HF signal waveform sharp, PLL circuit, Spindle motor circuit, and Spindle motor.
Does WQ signal turn at high level?
No
Q202
Yes
Q204, and Fluorescent tube.

IC DESCRIPTIONS

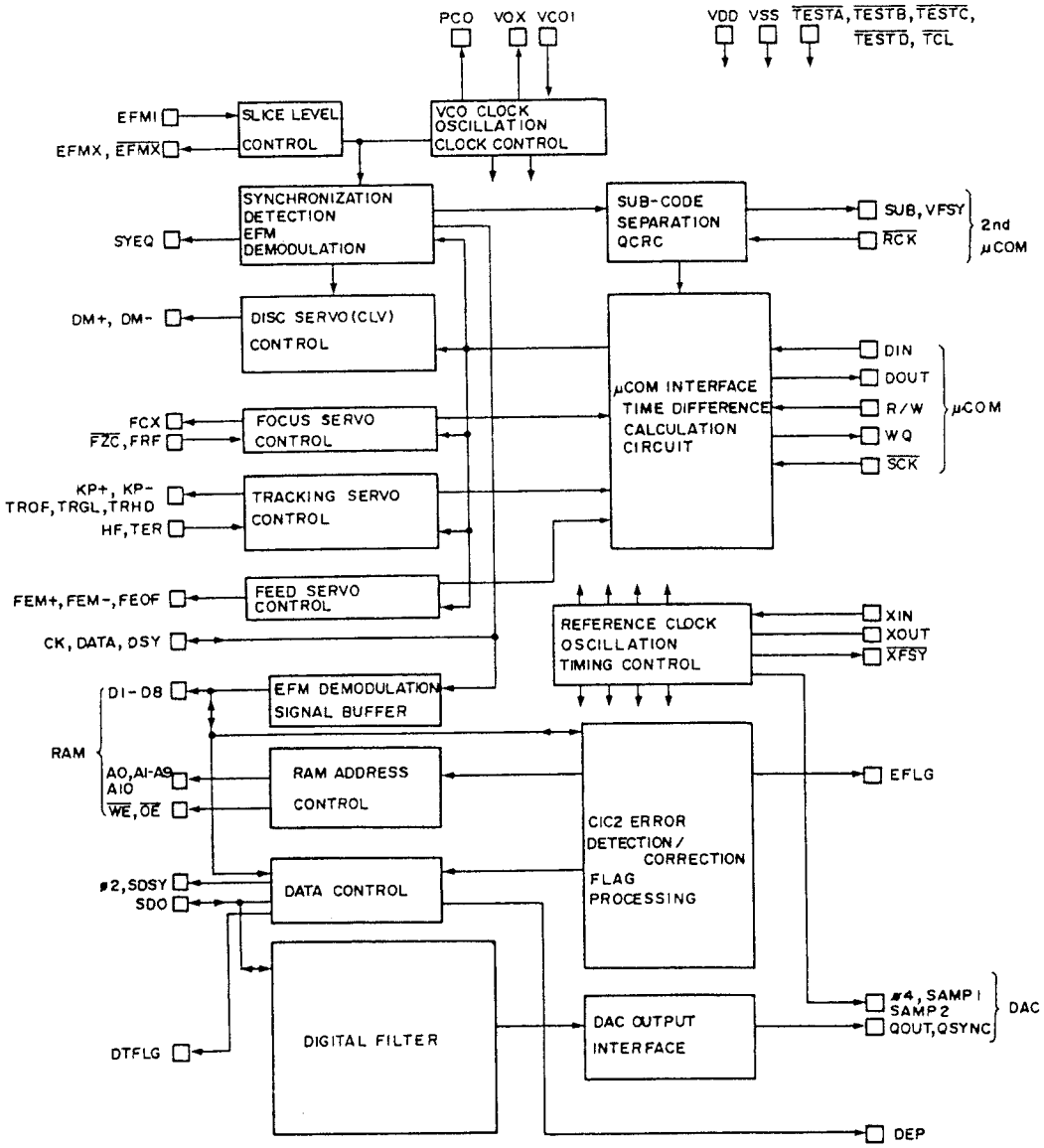
XB087A0(Servo Linear Circuit)

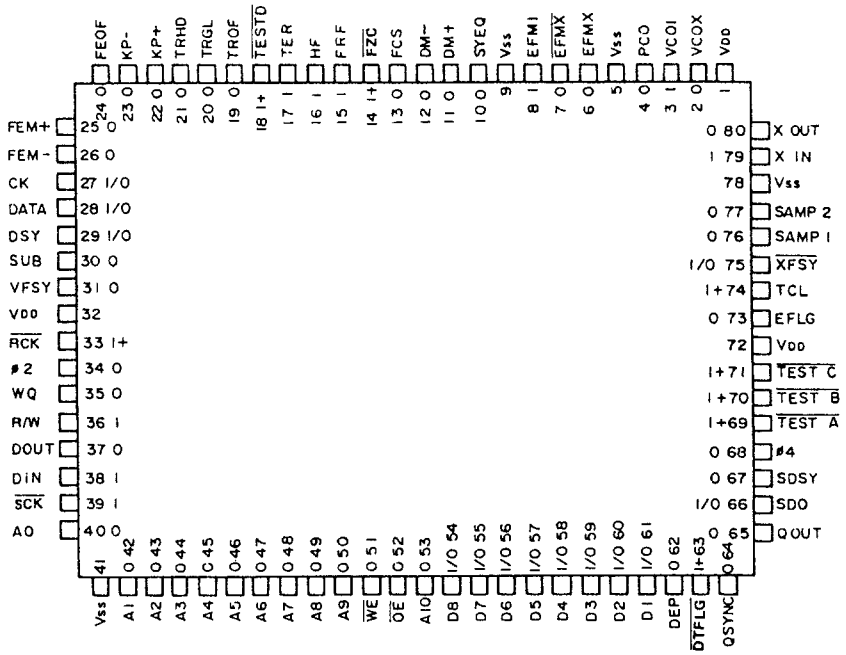


Pin No.	Designation	Function
2~4	FEO, FE−, FE+	Feed drive amplifier dvives the feed power amplifier and is rotated the feed motor.
5	TWC	Terminal of tracking drive limiter to tracking coil. The reference voltage of this circuit is about ±0.67V.
6~19		Tracking servo system terminals.
6~8	TDo, TDi−, TDi+	Tracking drive amplifier drives the tracking power amplifier and actuates the tracking actuator.
9~11	TH, TG, TS	Tracking jump control switches. TH: Tracking hold switch TG: Gain control switch TS: Tracking offset switch
12~13	TOF, CTH	These terminals are controlled the tracking loop by TH,TG and TS (pins 9,10,and 11).
14	TER	The output terminal of comparator of tracking zero cross.
15~16	TPo, TPi	Input/Output terminals of tracking preamplifier.
17~19	TE, E, F	This circuit is constituted by I-V conversion and differential amplifier. The reflected sub beams are converted into electric signals by the E and F, and the mutual differnces are obtained as a tracking error signal.
23~39		Focus servo system terminals.
23~24	AC, BD	Input terminals from main spot of photo diode.
25~26	HN, HF	Feedback terminal and output terminal of HF (RF) signal.
27~28	ED1, ED2	Terminals for peak hold (pin 27) and bottom hold (pin 28)of HF (RF) signal.
29, 30, 34		Output terminals of servo IC to control the focus tracking.
29	HF	HF output is L level on the track of disc and H level on mirror section.
30	FRF	This circuit is the focus servo to on when comes the focus point from focus search condition.

Pin No.	Designation	Function
34	FZC	Use when the focus search. Same as FRF
35	FCS	Signal input terminal to pull the focus.
36	FOF	Attenuator terminal.
37	CFC	Terminal to make the ramp waveform of focus search ramp circuit.
38~39	FDi, FDo	Input/output terminals of focus drive amplifier.
40~42	DM+, DM−, DMo	Input/output terminals of disc drive amplifier.

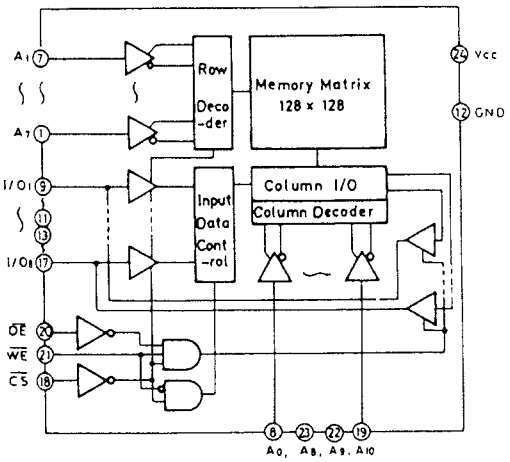
YM3805 (Signal Processor & Controller)



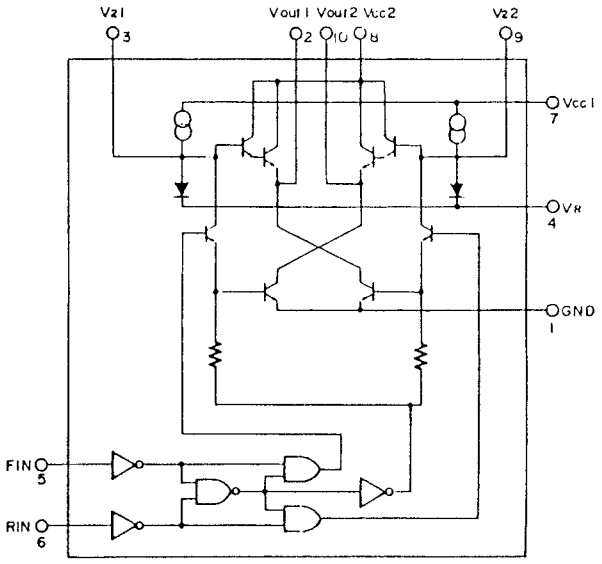


Pin No.	Designation	Function
79, 80	79 x IN and 80 x OUT	Clock Oscillator (8.6436MHz)
6~8	8 EFMI, 7 $\overline{\text{EFMX}}$, and 6 EFMX	EFM External Circuit
2~4	4 PCO, 3 VCO1, 2 VCOX	Clock Regeneration Circuit
10	SYEQ	WYNC Match Signal
27~29	27 CK, 28 DATA, and 29 DSY	FM Demondulation Signal Check Output
30, 31, 33	30 SUB, 31 VFSY, and 33 $\overline{\text{RCK}}$	Sub-code Output
35~37, 39	35 WQ, 36 R/W, 37 DOUT, and 39 $\overline{\text{SCK}}$	Q-code Output related Pins
36, 38, 39	36 R/W, 38 DIN, and 39 $\overline{\text{SCK}}$	μ COM Command related Pins
13~15	Input 14 $\overline{\text{FZC}}$ – 15 FRF, and Output 13 FCS	Focus Servo-mechanism related Pins
11, 12	11 DM+, and 12 DM–	Disc Servo-mechanism Pins
16, 17 19~23	Input 16 HF, and 17 TER Output 19 TROF, 20 TRGL, 21 TRHD, 22 KP+, and 23 KP–	Tracking Servo-mechanism related Pins
24~26	24 FEOF, 25 FEM+, and 26 FEM–	Feed Servo-mechanism related Pins
40, 42~61	40A0–53A10, 51 $\overline{\text{WE}}$, 52 $\overline{\text{OE}}$, and 54D8–61D1	RAM Connection
75	75 $\overline{\text{XFSY}}$	Crystal Clock SYNC Signal
73	73 EFLG	C1 and C2 Error Correction Check Signal
34, 66, 67 69, 71, 63	34 ϕ2, 66 SDO, SDSY, 63 DTFLG 69 $\overline{\text{TEST A}}$, and 71 $\overline{\text{TESTC}}$	DATA Control Circuit-Serial Signal Output
64, 65 68, 76, 77	65 Q OUT, 64 Q SYNC, 76 SAMP1, 77 SAMP, 2 and 68 ϕ4	DAC Interface
62	62 DEP	De-emphasis Signal
8, 18 69~71	69 $\overline{\text{TEST A}}$, 70 $\overline{\text{TEST B}}$, 71 $\overline{\text{TEST C}}$, 18 $\overline{\text{TEST D}}$, and 8 $\overline{\text{TCL}}$	Test Pins

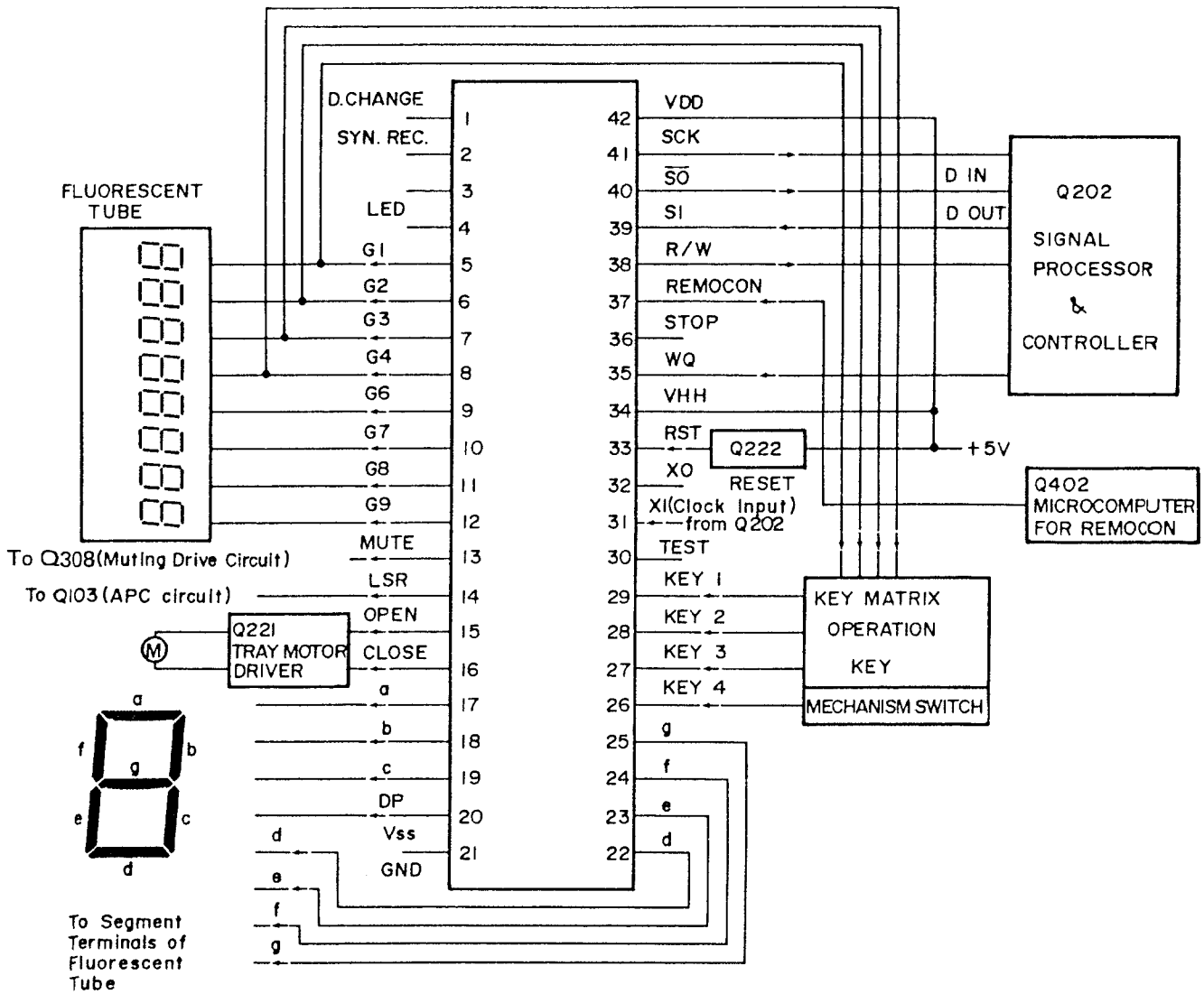
CXK5816M-15/HM6116F-P4(16bit RAM)

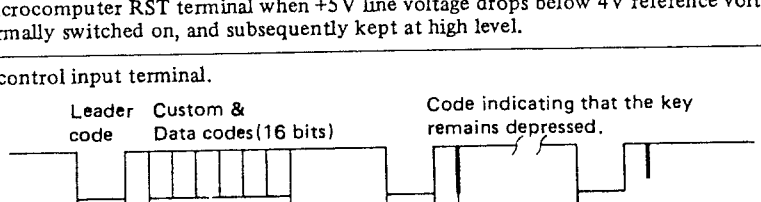


TA7354P (Motor Driver)

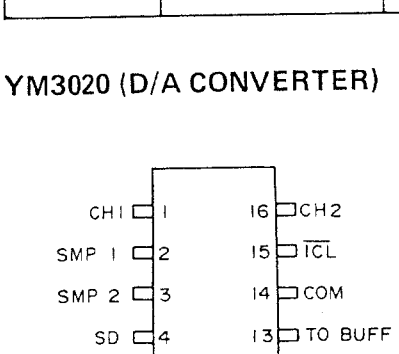


Connection of Micro Computer



Pin NO.	Terminal	Description
5~8 9~12 17~19 20 22~25	G1-G4 G6-G9 a-c DP d-g	Control of fluorescent display tube is used the dynamic driver method.The digit datas of eight figures and eight segment datas are output from microcomputer.
13	MUTE	Audio muting control output for audio muting when the disc is stopped, and during accessing operations and pause mode. Muting is applied when the output is at high level.
14	$\overline{LSR}$	Optical pick-up laser on/off control output. Laser is on when the output is at low level.
15 16	OPEN CLOSE	These signals used to control disc tray openning and closing operations. Control signals are passed direct from the microcomuter to pins 5 and 6 of the Q221 tray motor driver.
26	KEY 4	The condition of mechanical switches (open, close, and start) is processed, and data of switches is read by KEY 4 input port.
27~29	KEY 3-KEY 1	A 12(4x3) matrix is formed by using the digit datas. (Positive logic)
31	X1	Clock input from Q202.
33	RST	Using an IC designed specifically for microcomputer resetting, a reset output (low level) is applied to the microcomputer RST terminal when +5V line voltage drops below 4V reference voltage. This pin is normally switched on, and subsequently kept at high level.
37	REMOCON	Remote control input terminal. 
35	WQ	Write request: High level when transmit the information to micro computer.
38	R/W	Read/Write: High level when transmit the command from micro computer.
39	SI	Serial input: Transmit the servo system condition and sub-code data to micro computer.
40	$\overline{SO}$	Serial output: Transmit the command data from micro computer to servo system.
41	SCK	Serial clock: Clock of serial data.Data is shifted at trailing edge.

YM3020 (D/A CONVERTER)



Pin No.	Designation	Function (Assignment)
1.	V OUT CH1	Sample-hold analog switch output for Channel 1.
2.	SMP 1	Interval of signal at state "1" will be the sampling time of CH1.
3.	SMP 2	Interval of signal at state "1" will be the sampling time of CH2. The rising edge of SMP 1 and SMP 2 is used to generate the internal signal to latch the serial data. The level frequency characteristics will be improved as the signal time of SMP 1 and SMP 2 becomes longer.
4.	SD	Serial input of converted digital signal.
5.	FORM SELECT	Corresponds to binary input at state "1", and corresponds to 2's complement input at state "0".
6.	V_{SS}	Low-potential side power (GND).
7.	CLOCK	Clock to drive shift-resistor and time-generator ($\phi 4$).

Pin No.	Designation	Function (Assignment)
8.	V_{DD}	High-potential side reference power.
9.	V_{SS}	Low-potential side reference power (GND).
10.	RBH	Since the same resistance is inserted between the RBH pin and the internal V_{DD} power supply and between the RBL pin and the internal V_{SS} (GND) power supply, a high precision voltage of 1/2 V_{DD} can be obtained when both pins are connected. This voltage is applied on the MP pin through the buffer operational amplifier.
11.	RBL	As in the case of the basic circuit, the drift from 1/2 V_{DD} can be corrected by providing an appropriate external resistance on either one of the two pins.
12.	MP	An exponential analog shift is executed with the potential applied on MP as the reference. Normally, bias is appoied for 1/2 V_{DD}.
13.	TO BUFF	Analog output of DAC is input to buffer operational amplifier.
14.	COM	Common input of analog switch for CH1 and CH2.
15.	ICL	"1": Normal operation. "0": Will become no-signal output regardless of D signal.
16.	V_{OUT} CH2	Sample-hold analog switch output for CH2.

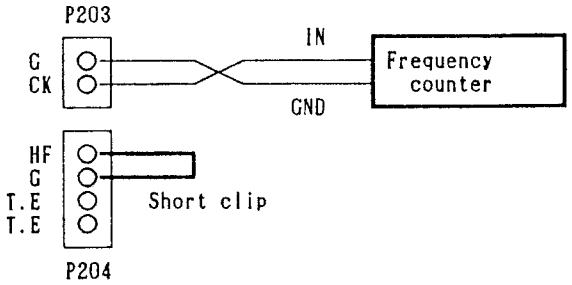
ADJUSTMENT PROCEDURES

Instruments required

Dual trace oscilloscope, Frequency counter, CR oscillator, Test disc (SONY YEDS-18 TYPE4), Short clip, Resistor. 1kohm

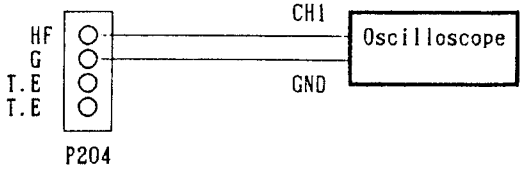
1. VCO frequency adjustment

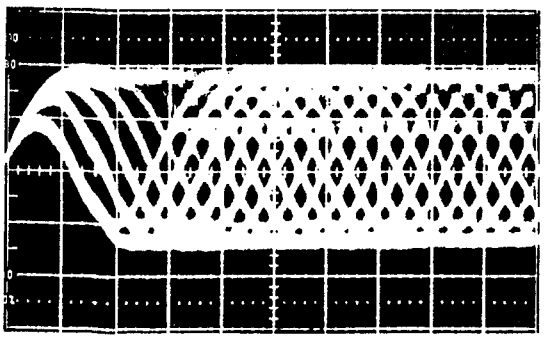
Turn the power switch to ON.
Connect the frequency counter to the pin 2 (CK) of P203.
Connect the pins 1 (HF) and 2 (GND) with the short clip.
Adjust L201 until the frequency counter reading 4.35MHz.
After adjustment, remove the frequency counter and short clip.



2. Focus offset adjustment

Load the test disc YEDS-18 and play back the track 2.
Connect the oscilloscope to pin 1 of P204.
Set R217 to mechanical center.
Adjust R217 until a clear trace of waveform pattern as shown photo 1 appear on the oscilloscope.
After adjustment, remove the oscilloscope.



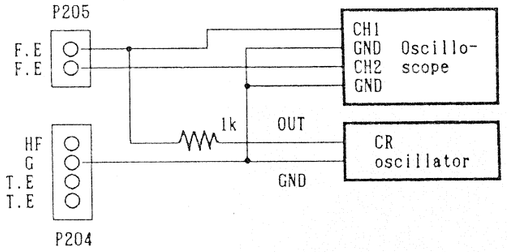


0.5V/div.
0.5μs/div.

Photo 1

3. Focus gain adjustment

Connect the dual trace oscilloscope to pins 1 (CH1) and 2 (CH2) of P205 at play condition.
Apply a sine wave 500mVp-p at 1kHz via resistor 1kohm from CR oscillator to pin 1 of P205.
Adjust R219 so that the waveforms of channel 1 and channel 2 become same level. (Refer photo 2).
After adjustment, remove the CR oscillator and oscilloscope.



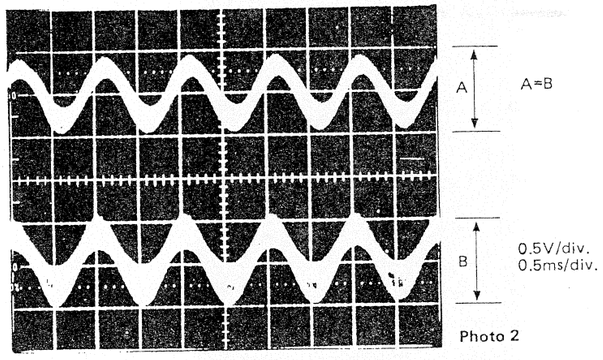
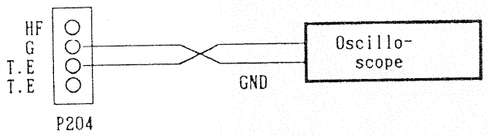


Photo 2

4. Tracking balance adjustment

Turn R269 to minimum position (counter-clockwise) at play condition.
Connect the oscilloscope to pin 3 (TE) of P204.
Adjust R279 until both positive and negative peaks of the waveform becomes equal at 0V level. (Refer photo 3)
After adjustment, set R269 to mechanical center and remove the oscilloscope.



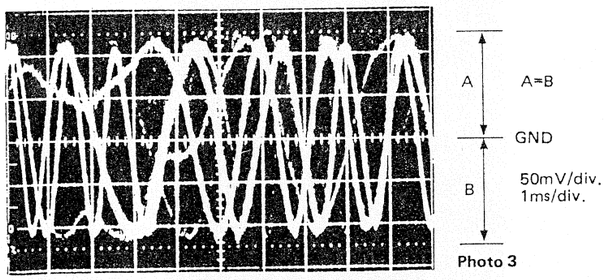
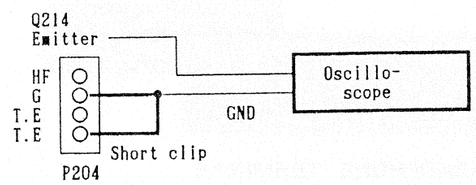


Photo 3

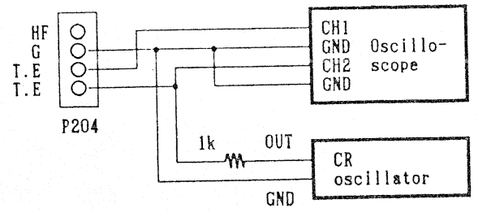
5. Tracking offset adjustment

Connect the oscilloscope to the emitter of Q214 (Output of slide motor) at play condition.
Connect the pins 4 (T.E) and 2 (GND) of P204 with the short clip.
Adjust R273 until both positive and negative peaks of the waveform becomes equal at 0V level.
After adjustment, remove the oscilloscope and short clip.



6. Tracking gain adjustment

Connect the dual trace oscilloscope to pins 3 (CH1) and 4 (CH2) of P204 at play condition.
Apply a sine wave 1 Vp-p at 1.2kHz via resistor 1kohm from CR oscillator to pin 4 of P204.
Adjust R269 so that the waveforms of channel 1 and channel 2 become same level. (Refer photo 4).
After adjustment, remove the CR oscillator and oscilloscope.



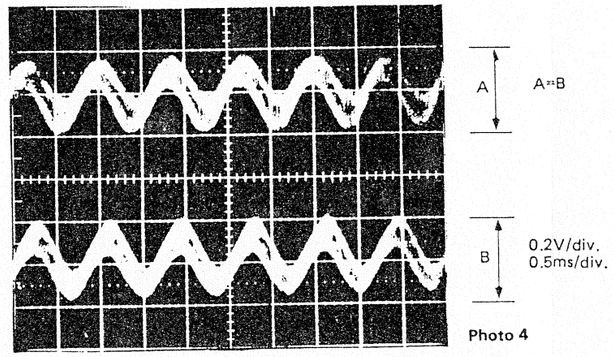
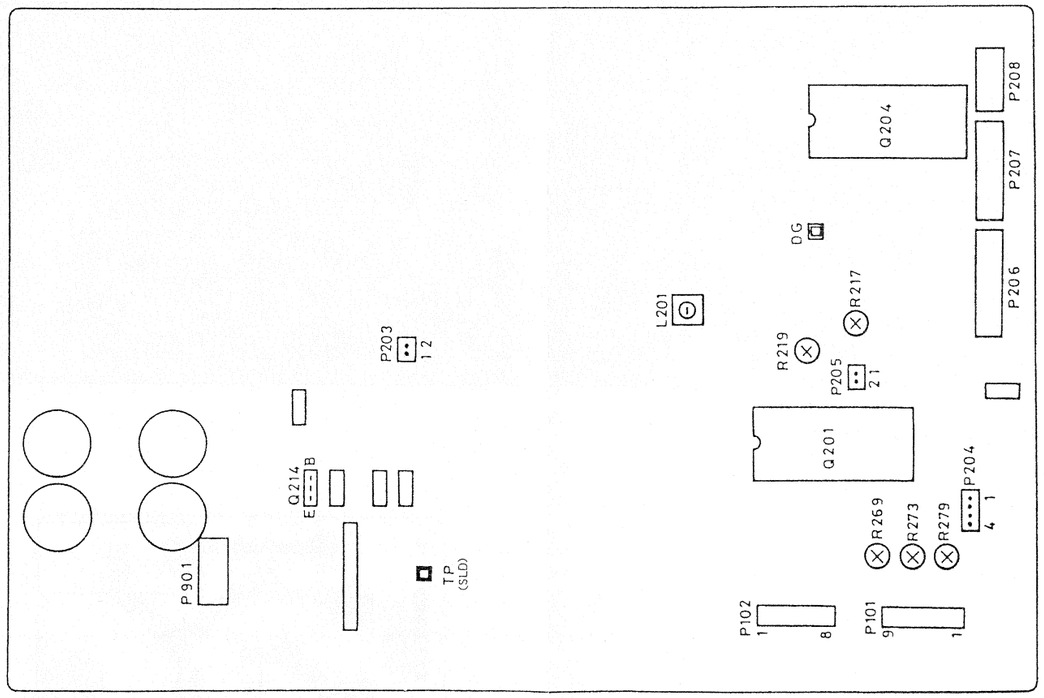
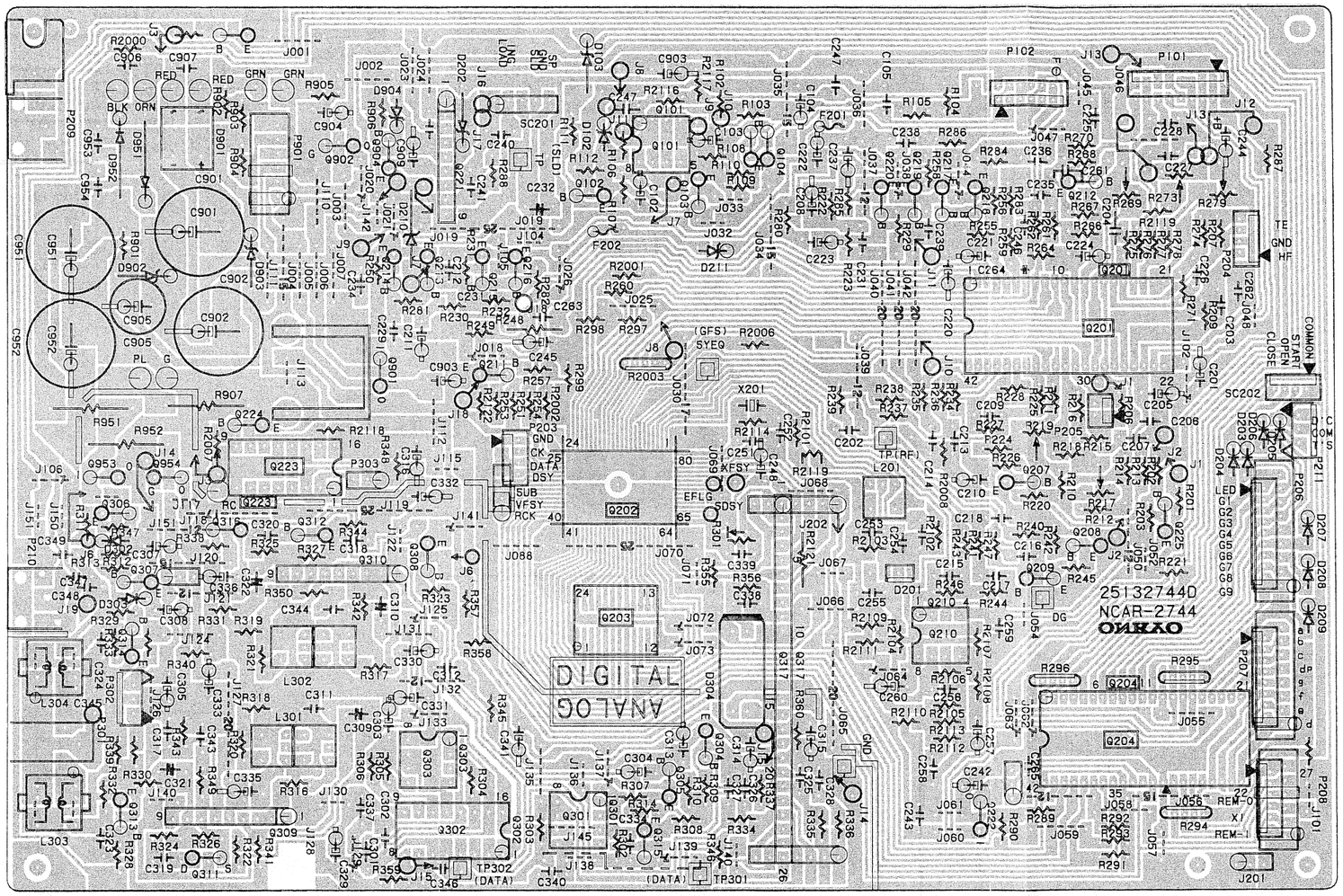


Photo 4

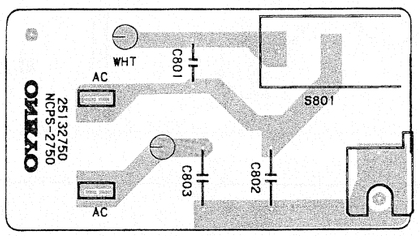


Adjustment Point

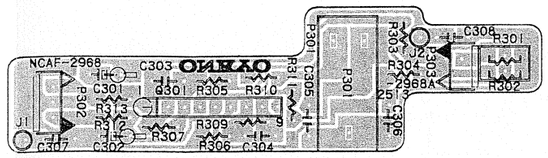
PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE



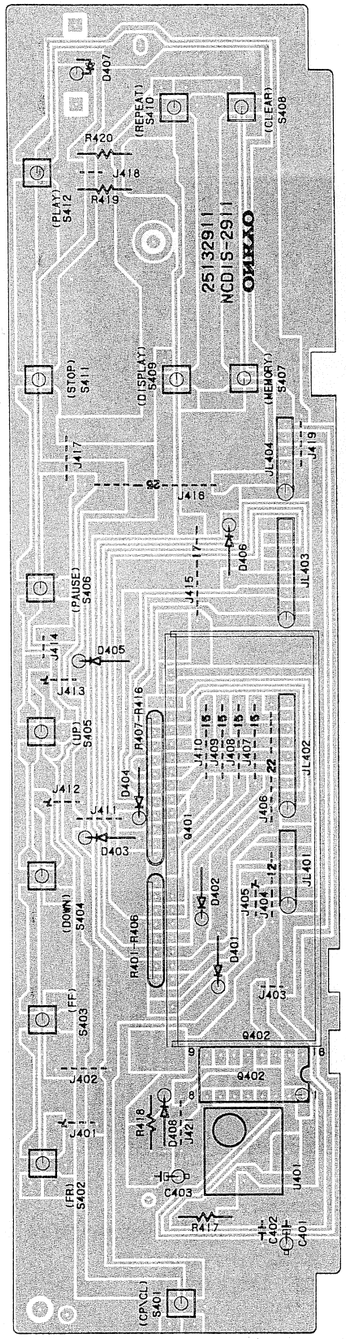
MAIN CIRCUIT PC BOARD



POWER SWITCH PC BOARD

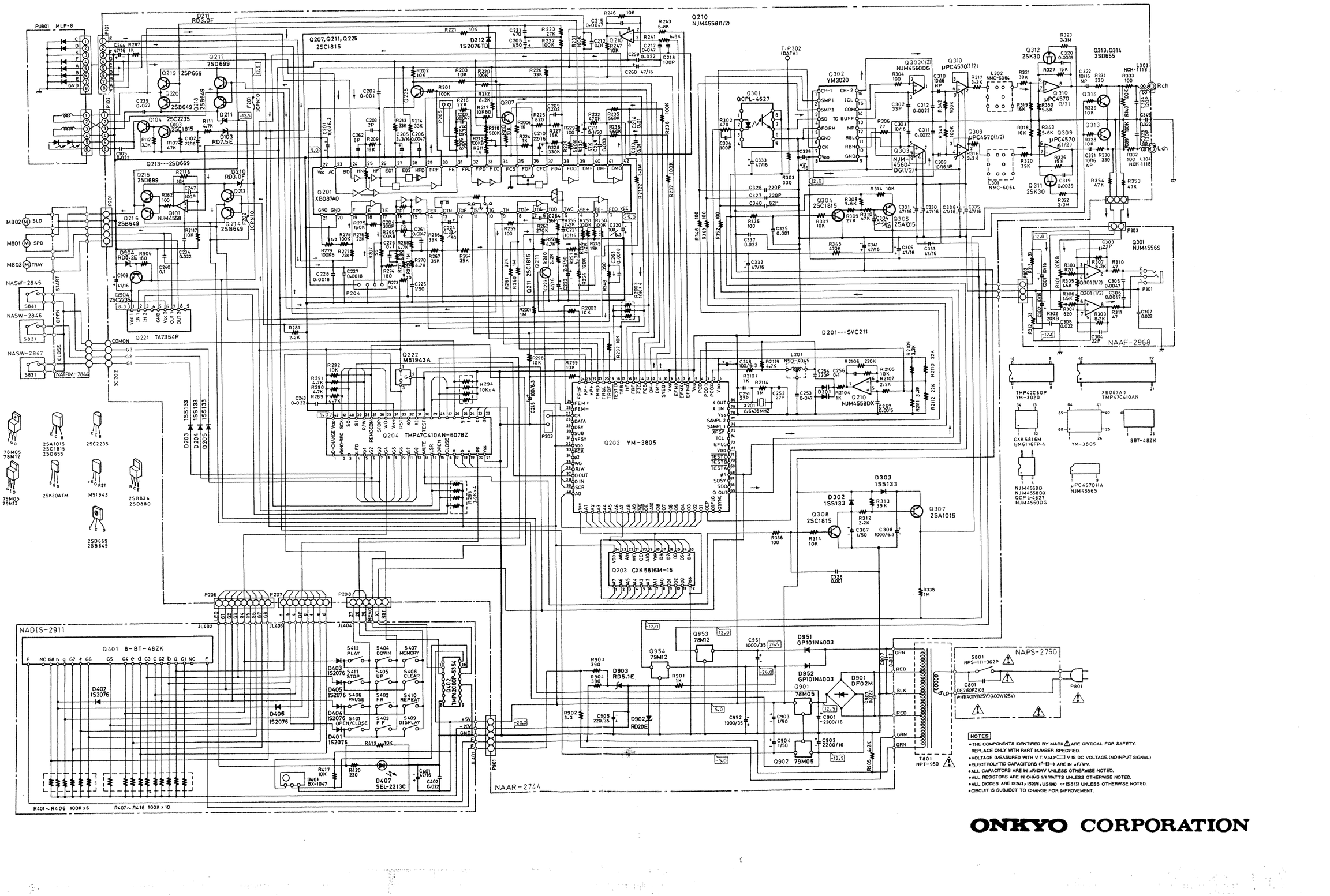


HEADPHONE TERMINAL PC BOARD



DISPLAY PC BOARD

SCHEMATIC DIAGRAM



NOTES

- THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
- VOLTAGE (MEASURED WITH V.T.V.M.) ▭ V IS DC VOLTAGE.(NO INPUT SIGNAL)
- ELECTROLYTIC CAPACITORS (⊣⊢) ARE IN μF/WV.
- ALL CAPACITORS ARE IN μF/50WV UNLESS OTHERWISE NOTED.
- ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
- ALL DIODES ARE 1S2076, 1S2076A, 1S1646 or 1SS118 UNLESS OTHERWISE NOTED.
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

ONKYO CORPORATION

PRINTED CIRCUIT BOARD-PARTS LIST

MAIN CIRCUIT PC BOARD(NAAR-2744-5A)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q101	222465	NJM-4558D
Q201	222984	XB087A0
Q202	222975	YM3805
Q203	222990 or 222882	CXK5816M-15 or HM6116F-P4
Q204	222986	TMP47C410AN-6078Z
Q210	222502	NJM-4558DX
Q221	222826	TA7354P
Q222	22240018	M51943A
Q301	226028	QPCL-4627
Q302	222969	YM-3020
Q303	22240002	NJM4560DG
Q309, Q310	22240014	μPC4570HA
Q901	222780052	78M05
Q902	222790052	79M05
Q953	222780122	78M12
Q954	222790122	79M12
	Transistors	
Q103, Q207	2211255	2SC1815(GR)
Q211	2211255	2SC1815(GR)
Q104	2211654	2SC2235(Y)
Q213, Q215	2200784 or	2SD669(C) or
Q217, Q219	2200783	2SD669(D)
Q214, Q216	2200794 or	2SB649(C) or
Q218, Q220	2200793	2SB649(D)

CAUTION: Replacement for transistors from Q213 to Q218, if necessary, must be made from the same beta group (HFE) as the original type.

Ex. 2SD669(C) 2SB649(C)
Same beta group

Q225	2211255	2SC1815(GR)
Q304, Q308	2211255	2SC1815(GR)
Q305, Q307	2211454 or 2211455	2SA1015(Y) or 2SA1015(GR)
Q311, Q312	2212375	2SK30ATM(GR)
Q313, Q314	2211704 or 2211705	2SD655(E) or 2SD655(F)
Q904	2211654	2SC2235(Y)
	Diodes	
D103	2243183 or 2239533	MTZ7.5C or RD7.5EB3
D201	225181	SVC211
D203-D205	223163	1SS133
D207	223163	1SS133
D210, D211	2243431 or 2243432	RD3.0FB1 or RD3.0FB2
D212	223145 or 223150	1S2076TD or US1040
D302, D303	223163	1SS133
D901	223892	DF02M
D902	2243282 or 2239732	MTZ20B or RD20EB2
D903	2243141 or 2239451	MTZ5.1A or RD5.1EB1
D904	2243191 or 2239551	MTZ8.2A or RD8.2EB1
D951, D952	223880	GP101N4003
	Crystal	
X201	3010084	KD3492D-A

CIRCUIT NO.	PART NO.	DESCRIPTION
	Coils	
L201	232129	NSO-4045
L301, L302	232137	NMC-6064
L303, L304	231066	NCH-1118
	Fuses	
F201, F202	252111	ICPN10, IC protector
	Capacitors	
C102	354742209	22μF, 16V, Elect.
C201	354721019	100μF, 6.3V, Elect.
C205	354780339	3.3μF, 50V, Elect.
C208	354780109	1μF, 50V, Elect.
C210	354742209	22μF, 16V, Elect.
C211	354781099	0.1μF, 50V, Elect.
C220	354721019	100μF, 6.3V, Elect.
C221	354741009	10μF, 16V, Elect.
C222	354780229	2.2μF, 50V, Elect.
C223	354744709	47μF, 16V, Elect.
C224	354783399	0.33μF, 50V, Elect.
C225	352980106	1μF, 50V, Non-polar elect.
C244	354744709	47μF, 16V, Elect.
C245	354721019	100μF, 6.3V, Elect.
C248	354721019	100μF, 6.3V, Elect.
C260	354744709	47μF, 16V, Elect.
C303	354741009	10μF, 16V, Elect.
C304	354783399	0.33μF, 50V, Elect.
C305	354744709	47μF, 16V, Elect.
C307	354780109	1μF, 50V, Elect.
C308	354721029	1000μF, 6.3V, Elect.
C309, C310	352941006	10μF, 16V, Non-polar elect.
C311, C312	372522224	2200pF±5%, 50V, Styrole
C319, C320	372523924	3900pF±5%, 50V, Styrole
C321, C322	352941006	10μF, 16V, Non-polar elect.
C323, C324	372521214	120pF±5%, 50V, Styrole
C329-C333	354744709	47μF, 16V, Elect.
C335, C336	354744709	47μF, 16V, Elect.
C341	354721019	100μF, 6.3V, Elect.
C901, C902	354742229	2200μF, 16V, Elect.
C903, C904	354780109	1μF, 50V, Elect.
C905	354762219	220μF, 35V, Elect.
C909	354744709	47μF, 16V, Elect.
C951, C952	354761029	1000μF, 35V, Elect.
	Resistors	
R217, R273	5210064	N06HR10KBD, Semi-fixed
R219, R269	5210070	N06HR100KBD, Semi-fixed
R279	5210070	N06HR100KBD, Semi-fixed
R294, R2003	49163103404	10kohmX4, 1/10W, Network
R295	49163392404	3.9kohmX4, 1/10W, Network
	Plugs	
P101	25055152	NPLG-8P136
P102	25055150	NPLG-6P134
P203, P205	25055146	NPLG-2P130
P204	25055148	NPLG-4P132
	Sockets	
SC201	2000444	NSAS-5P403
SC202	2000653	NSAS-4P609
P206	25050273	NSCT-9P101
P207	25050272	NSCT-8P100
P208, P901	25050270	NSCT-6P97
SC302	2000670	NSAS-2P626
SC902	2000669	NSAS-3P625

CIRCUIT NO.	PART NO.	DESCRIPTION
	Terminal	
P301	25045180	NPJ-2PDBL70

POWER SUPPLY CIRCUIT PC BOARD (NAPS-2750-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
C801	3500065A	0.01μF, AC400V/125V, Capacitor IS
S801	25035398	NPS-111-562P Power switch
	27300601	Cover, capacitor

HEADPHONE TERMINAL PC BOARD (NAAF-2968-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q301	222887	NJM4556S, IC
C301, C302	354741009	10μF, 16V, Elect. capacitors
R301, R302	5104172-1	N09RGL20KB15, Variable resistor
P301	25405139	HLJ054-01-010, Stero headphone terminal
P302	25055234	NPLG-3P218, Plug
P303	25055132	NPLG-2P-116, Plug

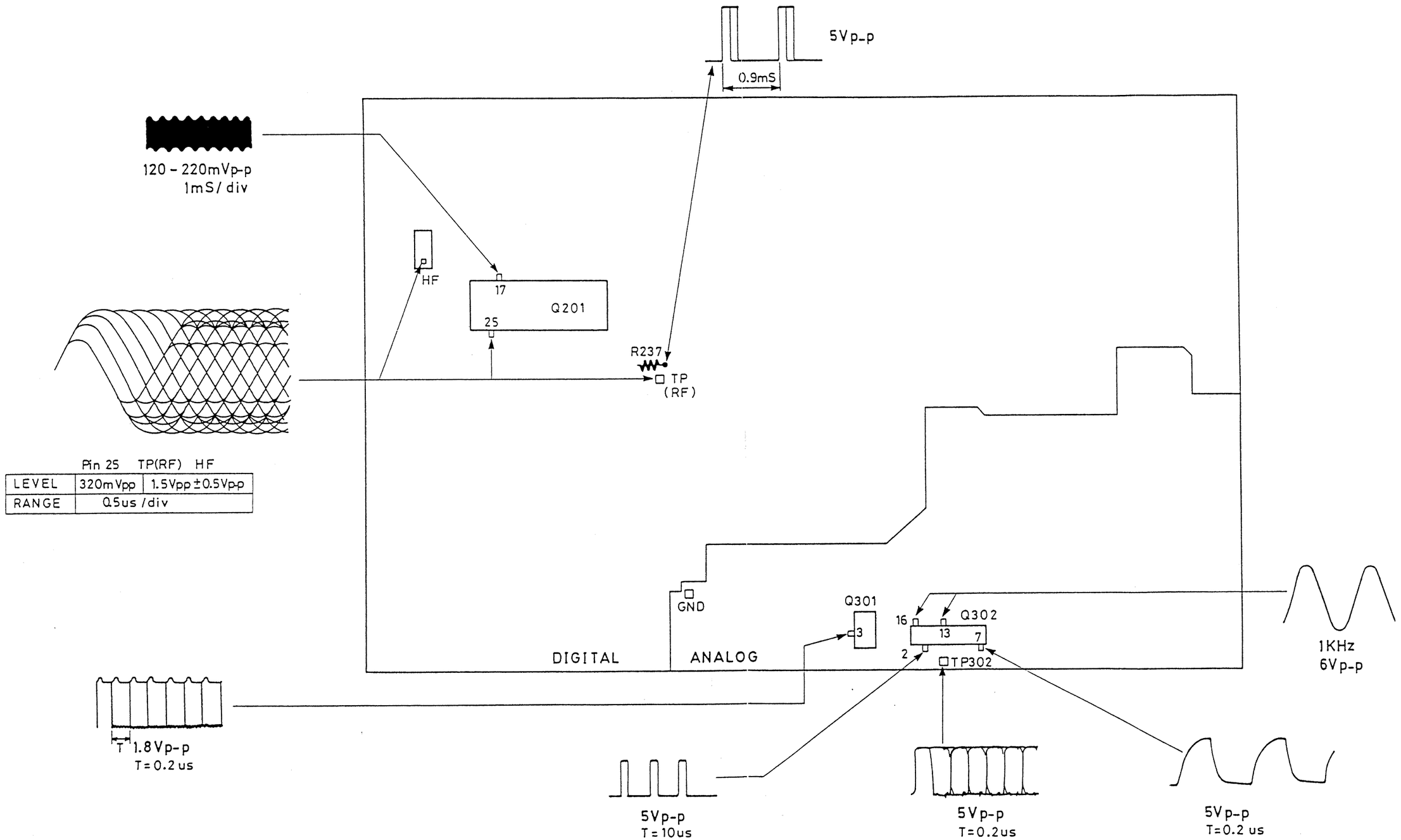
DISPLAY CIRCUIT PC BOARD(NADIS-2911-2)

CIRCUIT NO.	PART NO.	DESCRIPTION
U401	241068	BX-1407, Opto. module
Q401	212035	8-BT-48ZK, Fluorescent indicator tube
Q402	222989	TMP42C60P5534, IC
D401-D406	223145 or 223150	1S2076TD or US1040, Diodes
D407	225141	SEL2213C, LED
C401	355744709	47μF, 16V, Elect. capacitor
R401-R406	49421104406	100kohmX6, 1/8W, Network resistor
R407-R416	49121104410	100kohmX10, 1/10W, Network resistor
S401-S412	25035548	NPS-111-S510, Push switches
	28140694	4.5X7.5X25, Cushion
	27190527	Holder

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

WAVEFORM OF EACH SECTION

(when play back the track 2 of test disc YEDS-18)



Pin 25	TP(RF)	HF
LEVEL	320mVpp	1.5Vpp±0.5Vp-p
RANGE	0.5us /div	

BLOCK DIAGRAM